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THE METROPOLITAN DISTRICT COMMISSION

**ALEWIFE RESERVATION
& ALEWIFE BROOK**

MASTER PLAN

JUNE 2003



ACKNOWLEDGMENTS

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The MDC thanks the many community groups, area residents, and elected officials for their thoughtful contributions to the master planning process.

GOVERNMENT DOCUMENTS
COLLECTION

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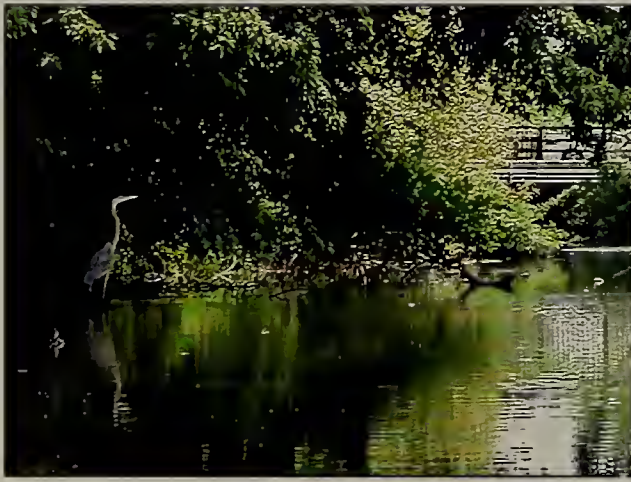
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CONTENTS

Preface	<i>i</i>
1. Introduction	1
A. The Need for a Master Plan	2
B. The Setting for the Master Plan	4
C. The Master Planning Process	9
2. Findings and Recommendations	11
A. Current Site Conditions	11
B. Goals and Objectives	18
C. Proposed Site Improvements and Amenities	19
D. Area-Specific Recommendations	32
3. Implementation	51
A. Design Process and Priorities	51
B. Schedule	52
C. Budget	53
D. Funding Sources	54
E. Required Permits	56
F. Encroachment Solutions	58
G. Maintenance and Management	59
H. Community Involvement and Stewardship	60
4. Related Projects and Recommendations	63
A. Projects Related to Study Area	63
B. Recommendations Beyond Study Area	67
Epilogue	73
Bibliography	75
Credits	81
Appendix A - Existing Flora and Fauna	83
Appendix B - Plant Lists	95
Appendix C - Sustainable Materials & Organic Products	105
Appendix D - Maintenance	109
Appendix E - Master Plan	115

PREFACE



As a meeting place — of earth and water, city and suburb, culture and ecology — the Alewife Reservation and Alewife Brook Parkway play an important role in the lives of people and other animals alike. The area is rich with physical and symbolic connections: hydrologic connections link wetlands, rivers, floodplains, and neighborhoods; restored and protected ecosystems link wildlife habitats and thus sustain biodiversity; a network of trails and paths connects people to each other, to a significant historic legacy, and to the wilder, natural world which is the home for many animals.

Urbanization and residential sprawl damage ecosystems and disconnect people from nature, exacting a significant toll on our physical and emotional well being. This Master Plan offers a prescription for ecosystem restoration of the Alewife Brook and Reservation, one small step toward restoring the balance between human and natural communities.



INTRODUCTION

- A. The Need for a Master Plan
- B. The Setting for the Master Plan
- C. The Master Planning Process

Alewife Reservation and the Alewife Brook Parkway are part of the Metropolitan Park System, the first regional park system in the country. Established in 1893, the system today comprises almost 20,000 acres of woodlands, rivers, coastline, wetlands, and urban parklands.

The Alewife Brook and its adjacent Parkway are important linear connections within the Metropolitan District Commission's park system. Near the end of the 19th century, the visionary landscape architect Charles Eliot planned the Alewife Brook Parkway as one link in his network of carriageway parks winding their way through the suburbs of Boston. Such carriageways, and later parkways for automobiles, were a synthesis of road and adjacent landscape designed for driving as a leisurely, recreational, and aesthetically enjoyable activity. Increased traffic and other development pressures have obscured the parkland component so that the road now dominates public perception of many historic parkways.

The Alewife Reservation, which has existed since the early 20th century, was purchased with the intent to fulfill Eliot's desire to connect the Mystic River with Fresh Pond. The intrinsic ecological value of the Alewife area was not recognized at the time.

Today the Reservation is one of Boston's largest urban wilds, a remnant of the Great Swamp that once stretched from Fresh Pond to Spy Pond. This relic of the former expanse of wetlands still provides valuable ecological functions such as wildlife habitat and filtering stormwater runoff. It also

serves as critical floodplain. These ecological values are being eroded as connections to other natural resource areas are lost to urban development.

The Alewife area's ecological and recreational virtues are often overlooked because it receives stormwater and combined sewer overflows from surrounding communities and is therefore perceived as a source of pollution and flooding. The Alewife Brook, the central landscape feature of the Alewife Brook corridor, lies unseen from the Parkway and fenced off from walkers, joggers and bicyclists. The Reservation has been used for Route 2 construction fill, illegally used as dumping grounds, inhabited by homeless people, encroached upon by abutters, and intensely developed along its border. Clearly the Alewife Reservation and Alewife Brook Greenway require and deserve renewed attention, resources and stewardship.

A. THE NEED FOR A MASTER PLAN

The Metropolitan District Commission (MDC) is a major property owner in the Alewife area, having management control of the majority of the green space located there, including the 115-acre Alewife Reservation and the 2.5-mile-long Alewife Brook and adjacent Parkway. The MDC has a renewed commitment to improve the Alewife Reservation and Alewife Brook corridor. The MDC commissioned this Master Plan to provide recommendations and guidelines by which the desired improvements of the Alewife Reservation and Alewife Brook corridor could be achieved.

This Master Plan envisions significant restoration of wildlife habitat and ecological and hydrological functions; enhanced recreational and educational opportunities; and improved connections to the system of protected natural areas and corridors in metropolitan Boston. In particular, the purpose of this Master Plan is to address the following key principles of ecologi-



FIGURE 1. This great blue heron is one of many wildlife species that are found in the Alewife Reservation.

cal restoration deemed necessary by the MDC:

- Preserve and protect existing aquatic and riparian (shoreline) resources from threats of further degradation.
- Restore, wherever possible, ecological structure and function in ways that are self-sustaining through time. Use bioengineering techniques, which rely on native plants and natural reinforcing methods.
- Consider recommendations for the Reservation and the Alewife Brook corridor within a larger watershed and landscape context.
- Address ongoing causes of degradation from a multidisciplinary perspective, applying the principles of geomorphology, ecology, hydrology, and hydraulics to develop comprehensive solutions.
- Add public access and recreational components.

This Master Plan presents a comprehensive set of planning and design recommendations. Both short-term and long-term actions are proposed to set this process in motion. The actions described in this document should be understood as setting the foundations for a sustainable future in which people and wildlife can harmoniously coexist in an urban wetland–river corridor landscape.

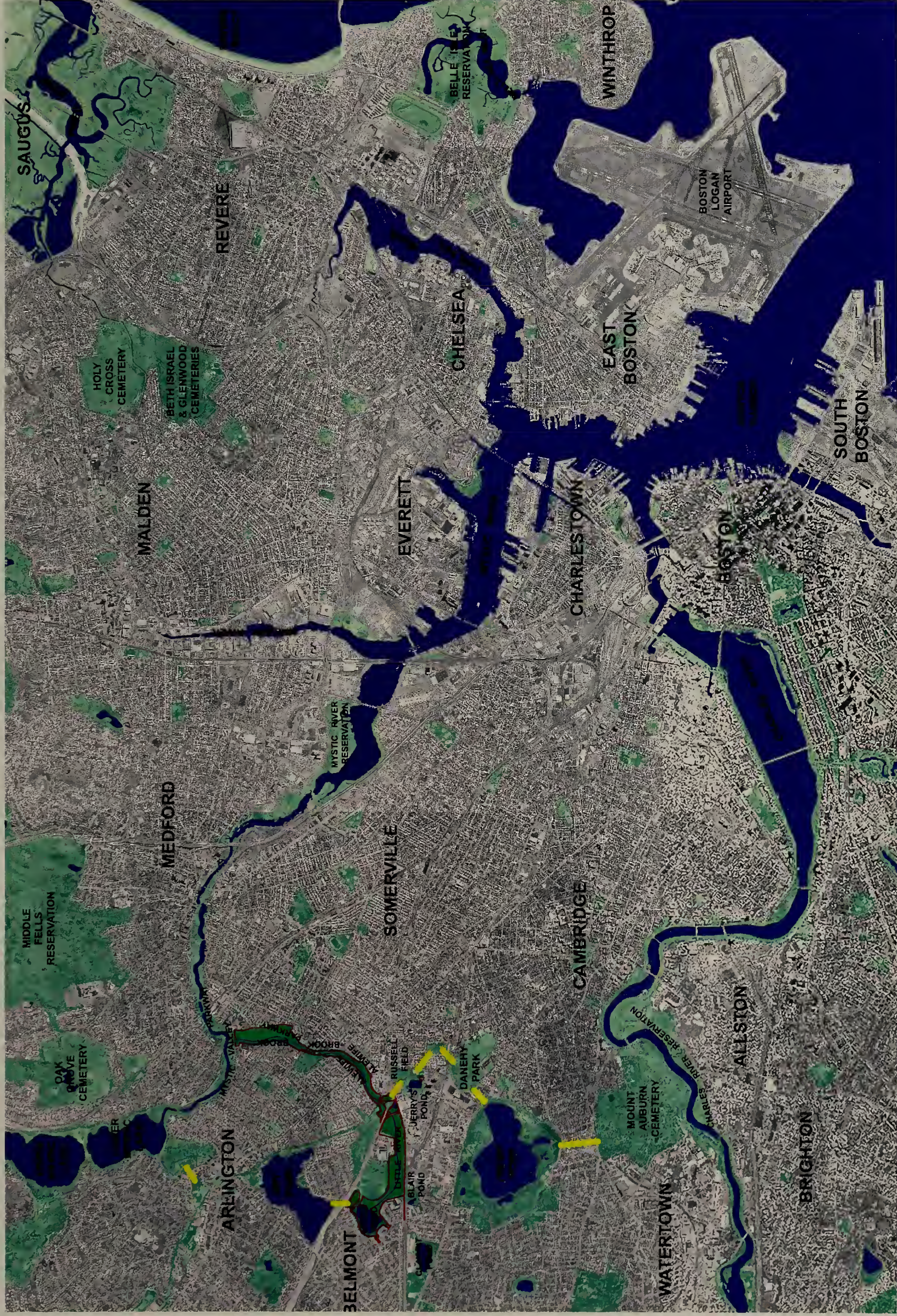


Figure 2. The study area for this Master Plan is outlined in red. The shaded green areas show major public and private open space areas in the metropolitan Boston region. The Alewife Brook joins the Mystic River, which empties into Boston Harbor.

B. THE SETTING FOR THE MASTER PLAN

B1. THE STUDY AREA

Alewife Reservation and Alewife Brook lie within the 9-square-mile Alewife Brook subwatershed. This subwatershed in turn forms part of the Mystic River watershed, a 79-square-mile area that drains to Boston Harbor.

The study area of this Master Plan encompasses the Alewife Reservation and the Alewife Brook Greenway north of Route 2 and is located along the borders of four towns and cities, namely, Arlington, Belmont, Cambridge, and Somerville (see Figure 2).

The Alewife Reservation roughly spans the area from Little Pond to the west, Yates Pond to the east, the Boston and Maine Railroad and Blair Pond to the south, and the Acorn Office Park [formerly Arthur D. Little (ADL) headquarters] and Route 2 to the north (see Appendix E, Master Plan for boundary-defining features). However, the study area excludes Blair Pond and its adjacent land (7 acres) from the 115-acre Reservation because a planning document was recently completed for Blair Pond (MDC, 1999). Interested citizens can contact the MDC planning office for a copy of the plan and brochure.

The Alewife Brook Greenway is a corridor that includes the Alewife Brook, the open space/parkland on the east and west sides of the brook, and the Alewife Brook Parkway. (The Parkway itself comprises the road surface, planted median, and rows of planted trees on both sides of the roadway.) The Greenway stretches between the Route 2 rotary (the former “Dewey and Almy rotary”) and the Mystic Valley Parkway. The area west of the brook (Arlington side) is spacious, with an average width of 300 feet whereas on the eastern side (Somerville), the open space consists of a nar-

row strip 50 feet wide. The Parkway lies to the east of the brook.

Alewife Brook Parkway stretches from the Route 2 rotary south to the Fresh Pond rotary. This section is not included in the study area. Recent improvements have been made by MDC along this section.

B2. THE ECOLOGICAL VALUE OF ALEWIFE RESERVATION AND ALEWIFE BROOK

The Alewife Reservation and Alewife Brook are examples of two important ecological systems: an urban wetland and an urban river corridor.

Urban Wetland

Wetlands such as those found in the Alewife Reservation are a key part of the hydrological cycle, and have significant impacts on both water quantity and quality. Wetlands slow down and absorb stormwater runoff, then gradually release the stored water over a prolonged period. The resulting reduction of peak flows helps to reduce flooding downstream. The slow movement of water through wetlands allows physical, chemical and biological processes to improve water quality by retaining and removing environmental contaminants such as heavy metals, phosphorous, and nitrogen.



FIGURE 3. This wetland is south of the Little River in the Reservation.

The complex physical form and variable water depths of wetlands allows emergent, submerged, and floating vegetation to develop, which in turn attracts a wide variety of animals for spawning, nesting, breeding, feeding, refuge from predators, and nursery rearing purposes. In highly developed areas such as Metropolitan Boston, an urban wetland can function as a refuge for a range of flora and fauna. In addition, because they constitute a transition between fully terrestrial and aquatic environments, wetlands provide a network of connections between other existing wildlife habitats.

Because Native Americans and European colonists often settled close to wetlands due to their role as food sources, these regions harbor a rich cultural heritage. Wetlands also offer myriad opportunities for natural history study and outdoor learning.

Urban River Corridor

As an urban river corridor, the Alewife Brook provides a number of significant ecological functions. Where the riparian (shoreline) edge is vegetated, surface water runoff is filtered before entering the river channel. Biochemical and physical processes remove contaminants and thereby improve water quality and protect downstream aquatic environments from diffuse pollution sources.

Rivers bounded by riparian forests act as corridors for the relatively safe movement of ani-

mals between isolated patches of habitat in a landscape that is increasingly fragmented by urban development. In many regions, river corridors serve as protected habitat for animals and support a biodiversity much greater than that found in nearby terrestrial, upland regions.



FIGURE 5. Confluence of Alewife Brook and Mystic River

Riverfronts have been and continue to be focal points for human economic and social activity. Particularly at the confluences of streams, which are depositional areas, artifacts of earlier human settlements are frequently found, making these important archeological sites. Contemporary uses of riverfronts range from the industrial to the recreational. People are drawn to rivers for contemplation, solace, and emotional rejuvenation, as well as for walking, birding, fishing, and more passive forms of recreation. Linear trail systems can provide extended routes for hikers and bicyclists uninterrupted by motorized traffic. Thus river corridors like the Alewife Brook can offer a respite from urbanization.

B3. NATIVE AMERICAN AND COLONIAL CULTURAL HISTORY

The Alewife area is steeped in a rich cultural history. In pre-colonial times, Pawtuckeog Indians inhabited the area. Archeological evidence shows that a permanent winter camp existed at the confluence of the Menotomy River (now the Alewife Brook) with the larger Mystic River. In the spring of each year, these Native Ameri-



FIGURE 4. The Alewife Brook corridor between Broadway and the Mystic Valley Parkway Bridge



FIGURE 6. Alewife and blueback herring are the major anadromous fish species in the Alewife system.

cans would establish seasonal camps along the shores of Spy and Little Ponds, as well as on the natural high point (later referred to by European settlers as “Black Island”) situated near the present-day Alewife subway station. The Pawtuckeog were drawn to this area by the annual runs of alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*), anadromous fish that migrate from the ocean to fresh water to spawn. In-stream fishing weirs along the Alewife Brook were used to gather the abundant fish, which were then dried, smoked, and stored for later use as a major winter food staple. High points in and around the marsh



FIGURE 7. A 1904 photograph showing agricultural activities near the border of the marsh, where flooding occurred only seasonally.

were used as hunting camps for parties pursuing the abundant waterfowl that the wetland supported. It was along the Alewife Brook that Squaw Sachem, a local tribal leader, decided to

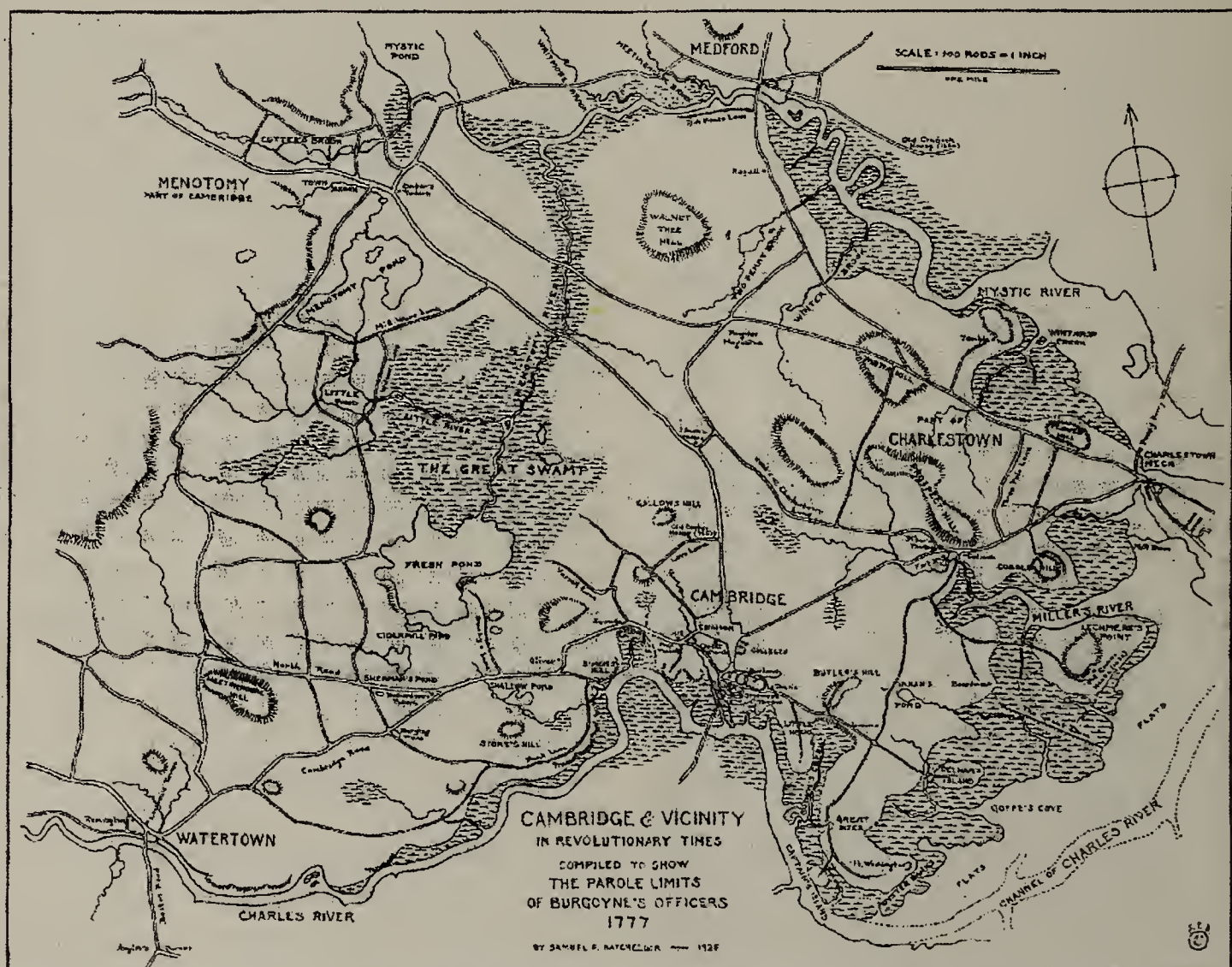


FIGURE 8. This historic map illustrates the extent of the Alewife water system when the Great Swamp was intact.

the colonists those lands that would later become the towns of Charlestown, Cambridge, and Watertown, in return for a small annual gift of corn and title to her wigwam overlooking Mystic Pond.

Given the proximity of the Alewife area to the developing towns of Boston and Charlestown, and the rich upland soils found around the perimeter of the tidal marsh, the area was used from the earliest days of European settlement in the Bay Colony. Soon to be referred to by the colonists as the “Great Swamp,” the first inroads into the area were to establish the common grazing land on Black Island.

With the growth in population of Newtowne (now Cambridge), more of the marsh was ditched and drained, first for pasture land, and later for orchards. The last farm persisted until the early 1950s on what is now the Acorn Office Park. The first cartways penetrated the Great Swamp in the 17th century, linking Cambridge with Concord. Later, the British fled from the skirmishes at Concord and Lexington across the Alewife Brook at the current site of the Massachusetts Avenue bridge.

B4. INDUSTRIAL DEVELOPMENT

As industrialization took hold of the area at the beginning of the 19th century, residents saw the Great Swamp as an attractive location for industrial activities deemed undesirable in proximity to the developing town. Tanneries,

slaughterhouses, glue factories, and transportation staging areas sprang up along the banks of Alewife Brook and were integral to supporting the cattle drives and markets that took place nearby at Porter Square. Ice harvesting at Fresh and Spy Ponds became one of the first international business ventures of the newly independent country, the ice being shipped around the world. However, it was the thick deposits

of alluvial clay beneath the Great Swamp — a product of the last ice age — that would spawn the industry that would most transform the entire Alewife landscape.

From the middle of the 19th century through the first decades of the 20th century, numerous pits were dug into the Great Swamp to extract the valuable clay for brick making. Today, Yates, Jerry, and Blair Ponds are remnants of this period. Similar clay pits have since disappeared beneath Danehy Park and the Rindge Towers apartments. Along with the clay industry came roads and rail lines, ovens and warehouses, and housing

developments and suburban infrastructure that would together accelerate the eventual filling of the Great Swamp.

In the 20th century, the Alewife area continued to develop. Residential development, iron works, chemical manufacturing plants, office buildings, the Fresh Pond Shopping Mall, a drive-in movie theater, automobile shops, landfills, gas stations, and entertainment clubs



FIGURE 9. This historic map of the Alewife Brook shows its meandering course prior to channelization and straightening.

have all left their mark on the landscape. Contaminated or waste disposal sites are another consequence of industrial development in this area; over 50 such sites exist on the periphery of the study area.

During the last decades of 20th century, the Alewife area became host to one of the more contentious environmental debates ever to occur in the Commonwealth of Massachusetts. The widening of the Route 2 Highway and the extension of the Red Line subway pitted groups of state and city planners and concerned citizens against one another and brought new attention to the area. (MDC opposition and public protest caused the proposed highway expansion to be shelved; the Red Line was extended from Harvard to Alewife, not to Arlington Heights as originally planned.) The long debate over the Red Line extension helped to preserve the Reservation as an urban wild; it had been slated for use as rail yards, which were subsequently moved underground.

Today, as the remaining green spaces within the Alewife area dwindle, heightened debates have begun again about how to maintain the last sliver of the Great Swamp that still exists within the Alewife Reservation, and how best to go about protecting it and the Alewife Brook Greenway from further degradation.

B5. ENVIRONMENTAL DEGRADATION

Development of the Alewife area has had its greatest influence on the area's hydrology. The gradual encroachment of the wetlands by colonial farms, industrial development and later suburban sprawl have all whittled away the Great Swamp through ditching, diking, draining, and dredging. Even so, during the middle of the 19th century, in the area that is today the Alewife Reservation, it was still possible to see a diversity of animals and plants.



FIGURE 10. Construction of the straightened concrete channel for Alewife Brook in 1911

One of the largest hydrological changes occurred toward the end of 19th century when the connection of Alewife Brook to Fresh Pond was severed to preserve the water quality of the latter, which had become the drinking water supply reservoir for the City of Cambridge. In time, the Alewife Brook and several other inflowing tributaries would disappear under concrete and be all but lost to memory. The most serious hydrological alterations occurred in the first decade of the 20th century when the Craddock Dam was built on the Mystic River in Medford, thereby preventing tidal flows (and spawning fish) from moving upstream. What had once been a dynamic, tidally influenced marsh became a freshwater wetland in which mosquitoes bred and raised fears of potential



FIGURE 11. The Alewife Brook Parkway and Henderson bridge shortly after construction in 1916

malarial outbreaks. Consequently, a massive excavation project was undertaken between 1909 and 1912, and the formerly meandering Alewife Brook was straightened, deepened, and channelized. The hydraulic profile was modified and the stream restricted in its access to its floodplain, all in an effort to further drain the once Great Swamp. During the 1930s, in an effort to claim yet more land from the wetland, the Little River was moved to a new location, and its old course filled in.

The legacy of these hydrological changes has been a loss of over 90% of the surface area of the Great Swamp. Water that was once stored in the wetlands of the Great Swamp now has nowhere to go and backs up into the streets and basements of local residents. The remaining portion of the wetland, located within the Alewife Reservation and squeezed between Route 2 and several buildings to the north and the office developments and subway station to the south, is today simply incapable of absorbing all the stormwater runoff that enters into the system. As development within the watershed continues, and more land is paved over, flooding intensifies. Today, new plans are being considered to convert a portion of the Reservation into a constructed treatment wetland to remove contaminants from the stormwater entering the stream and as a vital component of Cambridge's effort to separate most of the currently combined sewer and stormwater flows.

C. THE MASTER PLANNING PROCESS

The Alewife area has been the subject of many studies and plans for both development and open space preservation. Starting in the mid 1970s, spurred by the growing controversies about the widening of Route 2 and the Red Line subway extension, and continuing until the present time, various plans have been made about how to best manage, develop or pre-

serve the Alewife area. Topics have included industrial revitalization, sustainable development, wildlife preservation, stormwater management, transportation planning, open space management, brownfield redevelopment, office building construction, and river corridor park design.

With particular reference to the MDC's land, notable studies include two open space plans for the Alewife Reservation in 1978 and 1985, a restoration plan for segments of the Alewife Brook Parkway in 1996, and a Master Plan for Blair Pond in 1999. This current Alewife Master Plan builds upon past work and integrates many other technical studies that have been conducted over the years.

This Master Plan was developed through a multi-phase planning process. First, an inventory of physical, biological, and cultural resources in the study area was conducted. The information from the inventory was then used to formulate goals and objectives for the Master Plan.

Goals:

1. Improve water quality and restore natural hydrology.
2. Protect and enhance wildlife habitat.
3. Improve recreational, educational and other cultural opportunities.
4. Provide for maintenance that minimizes costs and maximizes effectiveness.

These goals and objectives, described in detail in Section 2B, were the framework for the subsequent Opportunities and Options phase, as well as for the development of specific recommendations discussed in Section 2D. At each phase, public meetings were held to provide a forum for concerned neighbors, abutters, local officials, and interest groups to comment on the elements of the developing Master Plan.

C1. INVENTORY OF RESOURCES

The Inventory of Resources consisted of a detailed program of site visits, research of previously published documents, compilation of additional relevant data from archives and libraries, and consideration of public comments. The physical resources assessed by the inventory included topography, geology, soils, hydrology, and geomorphology. Biological resources included fish, terrestrial plants and animals, habitat types, invasive species, rare or endangered species of special concern, and ecosystem functions. Finally, cultural and socioeconomic resources included historical sites, open space recreation areas, existing land uses, contaminated sites, utilities, transportation linkages, and residential areas. Section 2A provides a more detailed discussion of current site conditions as documented in the Inventory of Resources.

The inventory also includes a series of comprehensive maps identifying those locations in the Alewife Reservation and Alewife Brook corridor that are particularly significant.

C2. OPPORTUNITIES AND OPTIONS

In the Opportunities and Options phase, the planning team prepared two conceptual plans for the Alewife Reservation and the Alewife Brook Greenway. These designs were guided by the Master Plan goals and objectives and were based on information from the Inventory of

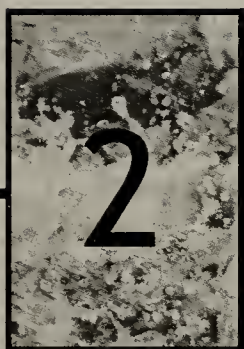
Resources as well as comments from previous public meetings. The two alternatives differed in their relative emphasis on cultural and ecological concerns. Public meetings held during this phase generated additional responses that led finally to the development of a preferred alternative.

C3. PREFERRED ALTERNATIVE

The preferred alternative synthesizes elements from the earlier conceptual plans that were deemed by the public, MDC administrators, and planning team as the most desirable and achievable options for implementation. This preferred alternative was then presented at a community meeting for another round of public comment. This Master Plan reflects the adjustments to the preferred alternative resulting from that public process.



FIGURE 12. At public meetings, area residents had the opportunity to interact with members of the master planning team.



FINDINGS AND RECOMMENDATIONS

- A. Current Site Conditions
- B. Goals and Objectives
- C. Proposed Site Improvements and Amenities
- D. Area Specific Recommendations

A. CURRENT SITE CONDITIONS

The study area is the last remnant of the former Great Swamp that once stretched from Fresh Pond to the Mystic River. However, this relict ecosystem has been highly altered by the use and re-use of the area over the past 350 years. Even the briefest review of historical descriptions and illustrations makes clear that the appearance of the area and its vegetation, topography, soils, and geomorphology differ greatly from conditions at the time of European colonial settlement. Despite these radical changes, the area still provides ecological functions that are effectively irreplaceable. Fundamentally, water still drains through the subwatershed to the Alewife Brook. This flow of water — however altered the inputs and flow, and however contaminated the water — persists and continues to define the ecological value of the area. Little River and Alewife Brook remain the lifeblood of the area.

A1. PHYSICAL RESOURCES

Most of the study area is the floodplain of the Little River and Alewife Brook and is flat and low-lying. The overall elevation gradient along the length of the study area is less than half a foot, and the average elevation of the study area is less than several feet above sea level. The area is so low in elevation that at times the Mystic River flows upstream into Alewife Brook in a reverse flow.

Following the retreat of the last glaciers 15,000 years ago, kettle ponds such as Fresh Pond and Spy Pond formed, and sands and gravels were deposited in the glacial outwash. An ancient riverbed that once ran through the area deposited the clays that were later mined for brick-making. Generally bedrock lies more than five feet below the surface. Most of the surface soils of the Alewife area were subsequently highly disturbed by cut and fill activities during development of the area. Most of the soils now lack characteristics of naturally developed, undisturbed soils, such as defined layers and horizons, and their poor quality may serve as a constraint to restoration.



FIGURE 13. View of Yates Pond from the top of the Alewife subway station.

In addition to the soils, the hydrology of the Alewife area is also radically altered from its original condition. The major tributaries to Little River, Wellington Brook and Winn's Brook, and the original hydrological connection with Spy Pond all enter the system now via underground pipes. Flow from Fresh Pond, the original source of water in Alewife Brook, was blocked in the 1870s, and most of Alewife Brook, upstream of its confluence with Little River, was buried in a pipe in the 1940s. The construction of Craddock Dam (since removed) and Amelia Earhart Dam on the Mystic River blocked tidal flow from Boston Harbor, converting the Great Swamp from a tidal marsh to a freshwater wetland. Finally, the meandering Alewife Brook downstream of

its confluence with the Little River was straightened and made to flow in a concrete channel to speed drainage of water from upstream. Urbanization in the surrounding areas decreased groundwater recharge, resulting in lower base flow. The increased stormwater runoff from the contributing watershed also causes increased peak flows. These sudden, high inputs of large amounts of stormwater into the pond and stream system contribute to bank erosion. Despite these modifications to the hydrological system, all the original hydrological connections remain in one form or another, except for the connection to Fresh Pond.

Water quality in Little River and Alewife Brook is poor because of stormwater and sanitary sewer discharges. The degraded condition of Alewife wetlands also means they are less effective at their natural function of buffering and improving water quality. More than 60 stormwater and combined sewer outfalls (CSO) discharge directly to the study area, while Spy Pond, Wellington Brook, and Winn's Pond bring significant quantities of contaminated stormwater from Belmont and Arlington. Recent projects by Somerville and Cambridge to separate storm and sanitary sewer systems have significantly improved water quality, and continuing projects will yield yet more improvements in the future.



FIGURE 14. The Alewife Reservation, shown during a major storm event, serves as the floodplain for the Little River.

Alewife's altered hydrology combined with extensive development in its floodplain results in severe flooding problems for some residents. There is simply too little flood storage capacity to accommodate very large storm events. In addition, hydraulic constrictions, most notably at the Massachusetts Avenue and Broadway bridges over Alewife Brook, impede river flow during high flow events. Given the sanitary sewer inputs to the system, local flooding may be a health hazard as well.

A2. BIOLOGICAL RESOURCES

Although the various places within the Alewife Reservation and the Alewife Brook corridor seem distinct or different, they are all connected by the water that runs through them. Water unifies the Alewife area. Given how difficult it is to see any water when passing through the area on its two major thoroughfares, Route 2 and Alewife Brook Parkway, most people are surprised to learn just how wet the Alewife area is under normal conditions.

Five ponds lie within the Reservation, and five more ponds lie on adjacent properties. Some ponds are natural, such as Little Pond and Blair Pond, whereas others were made when clay was excavated for brick-making, such as Yates Pond. Three streams, namely, Wellington Brook, Winn's Brook, and Little River contribute to Alewife Brook before it joins the Mystic River. In addition, numerous drainage channels maintain the hydrological connections among the ponds, streams, and wetlands. The wetlands include shallow marshes, wooded swamps, wet meadows, and two human-made wetland types, namely, stormwater detention basins and created mitigation wetlands.

Upland areas, that is, areas that lie outside the 100 year floodplain, are very limited. The only major upland within the Reservation is the site of the former MDC skating rink, northeast of Little Pond. A few other locations in the

Reservation and Greenway are elevated, typically because of fill activities, and lie outside of the floodplain. This lack of upland habitat, combined with naturally high groundwater elevations, limit the opportunities to create additional flood storage capacity in the area. The most significant areas that lie outside the floodplain occur on abutting properties such as the Belmont Uplands, portions of the Acorn Office Park (former ADL campus), and the Martignetti property.

Because most of the Alewife area is a low-lying network of wet places, most of the habitat is either aquatic or wetland of various types. Although both the aquatic and wetland habitat are degraded, the aquatic habitat is relatively worse off. Poor water quality, the long stretch of concrete channel, and the extensive siltation that has occurred in the ponds and non-concrete channel beds dramatically reduce the habitat value of the ponds and streams for fish and aquatic plants.

Most of the native fish species that once would have lived and bred in the Alewife waters are no longer found in the system. Fish such as brook trout, brown bullhead, and white perch have been replaced by nonnative species such as largemouth bass and common carp, the dominant fish at Alewife (refer to Appendix A for a list of existing flora and fauna). Anadromous fish species, namely, alewife and blueback herring, were once so abundant that sometimes 50,000 fish were caught in one catch. The Amelia Earhart Dam at Boston Harbor continues to be an obstruction for fish passage but small numbers of alewife and blueback herring still manage to migrate up Alewife Brook and Little River to spawn in Little Pond and Wellington Brook.

Where siltation has reduced stream depth to less than 12 inches, water temperature tends to be too high for many native fish species. Common carp, which tend to fare better un-

HABITAT INVENTORY

LEGEND:	
	LIMIT OF PROJECT AREA (APPROXIMATE)
	TOWN/CITY BORDER
	PLAYING FIELDS (PERVIOUS)
HABITATS	
	OPEN WATER (STREAM, SWALE, POND)
	STANDING WATER WITH EMERGENT VEGETATION
	INTERMITTENT CHANNEL
	WOODLAND / CONTINUOUS CANOPY
	GRASSLAND
	WOODLAND WITH STANDING WATER
	GRASSLAND WITH STANDING WATER
	CREATED WETLAND
	MOWED GRASS WITH SCATTERED TREES
	TREE-LINED BANK WITH CONTINUOUS CANOPY
	PARKWAY EDGE (TREES, MOWN GRASS, PAVING)
	WETLAND DELINEATION APPROVED BY LOCAL COMMISSION
	POTENTIAL VERNAL POOL
INVASIVE SPECIES DOMINANCE	
	JAPANESE KNOTWEED
	COMMON REED
	WATER CHESTNUT
MONOTYPIC STANDS OF PLANTS	
	CATTAIL
	STAGHORN SUMAC
	QUAKING ASPEN
HABITAT VALUE FOR WILDLIFE	
	HIGH VALUE AQUATIC HABITAT
	HIGH VALUE TERRESTRIAL HABITAT
WILDLIFE	
	BEAVER
	FOX
	MUSKRAT
	TURTLE
	RIVER HERRING (ALEWIFE, BLUEBACK, HERRING)
	OTHER FISH (CARP, ETC.)
	HERONS (GREAT BLUE, BLACK, CROWNED NIGHT, GREENBACKED)
	WATERFOWL (CANADA, GEESSE, BLACK DUCK, MALLARD DUCK, ETC.)
	KILLOEER
	WOODCOCK
	MIGRATORY BIRDS (ROBINS, REDWINGED BLACKBIRD, ETC.)
	BIRDS OF PREY



FIGURE 15. A series of comprehensive maps was produced to illustrate the resources at the Alewife Reservation and the Alewife Brook Greenway. This excerpt from the habitat inventory map shows habitat types and species of importance in the Alewife Reservation.

der these warm, shallow, and low-water-quality conditions, appear to consume most of the aquatic vegetation that does manage to grow in the stream channels. In contrast to the streams, the Alewife ponds have some aquatic plants such as pondweed, bladderwort and water milfoil. Three years ago Blair Pond and Little Pond were badly infested with the invasive water chestnut, but a concerned citizen has controlled the problem by hand-removing the plants at precisely the correct time before they release their seeds. Infestation is under control, but continuing effort is needed to prevent re-infestation.

The land on the north and south banks of the Little River is primarily wetland, but var-



FIGURE 16. Beavers have recently begun feeding on quaking aspen saplings along the Little River.

ies from wooded swamp to open wet meadow. Weeping willow, black willow, gray birch, silver maple and quaking aspen are important trees offering canopy cover and habitat for birds and mammals. Coyote scat were found on the north bank during a 2002 wildlife inventory (refer to Appendix A for a list of existing flora and fauna). The MDC land surrounding the Little River and abutting properties (Belmont Uplands, ADL wetland, Martignetti property, and Acorn Office Park) is the largest contiguous area of natural habitat in the area. No doubt this explains the presence of larger mammals such as coyote and deer and its attraction to the large birds of prey that frequent the area.

The Reservation has plentiful food for predators that feed on rabbits, feral cats, moles, and other small mammals.

Extensive stands of *Phragmites* (common reed) and areas of thick understory shrubs and vines provide extensive cover to small mammals. Common species in the understory include sumac, dogwood, speckled alder, and various *Viburnum*. Bald eagles have been sighted at the Reservation, while other birds of prey appear to be resident. For example, a Peregrine falcon has lived in the area for a number of years and at times is sighted almost daily perched on the top of the Rindge Apartment Towers during morning rush hour. Migratory waterfowl and songbirds also regularly visit the area.



FIGURE 17. Woodcocks, which can be observed in the Alewife Reservation, prefer wet, scrubby habitat interspersed with open grassy areas, a habitat type that is being lost state-wide to forest succession and bottomland development.

Most of the open wetlands are dominated by *Phragmites* due to soil disturbance and altered hydrology. However, several stands of cattail can be found in the Reservation, on the northeast corner of Little Pond, and in the cattail marsh just downstream of the Route 2 rotary.

In the Alewife Brook corridor, along the stream banks, the main habitat types differ from the Reservation. Several long stretches along the Parkway consist of more formal parkland with specimen trees, mown lawn, and pedestrian paths.

The parklike character of the west and east bank Greenway contrasts with the habitat on the banks of the Alewife Brook. In the Greenway section, the Alewife Brook is fenced off and flows through a long stretch of concrete-lined channel. Within the fences that line the brook, the banks support extensive woody vegetation in some areas and in other areas very extensive and well-established stands of another invasive species, Japanese knotweed. Along the tree-lined sections of bank, maple, oak, alder, birch, willow, locust, sycamore, and pin cherry provide a relatively diverse flora. However, less desirable species such as sumac and tree-of-heaven are also common. Horned owls, kingfishers, and great blue herons are some of the birds that are seen, and both red foxes and muskrats are known to use the Greenway.

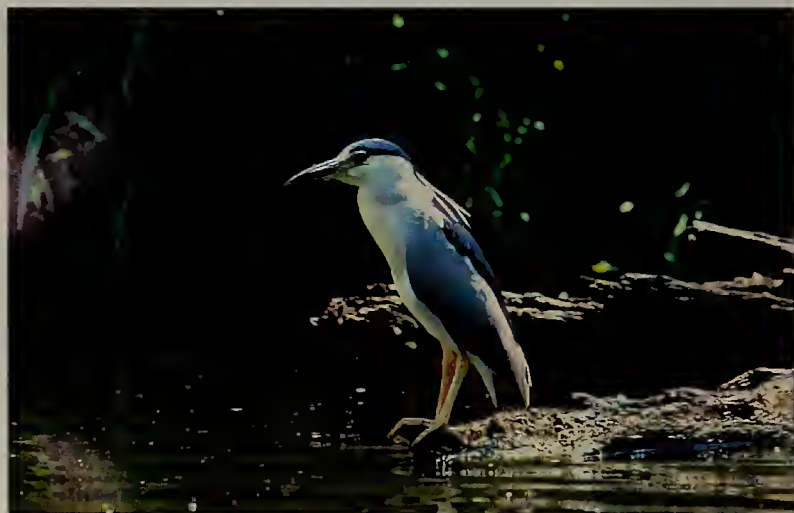


FIGURE 18. Black-crowned night herons have been reported to roost in the area where the Little River leaves Little Pond.

In summary, significant ecological resources were identified in the Alewife Reservation and Alewife Brook corridor, and for most of these resources, their value extended well beyond the boundaries of the study area. The area provides flood storage capacity to the whole subwatershed and to a “sewershed” that goes beyond the borders of the subwatershed. The wildlife habitat serves to support animals that otherwise would struggle to survive in the surrounding four municipalities. Although not formally recognized, rare, endangered, and/or protected bird species use the area, as well as migrating birds.



FIGURE 19. A number of turtle species can be found in the Alewife Reservation such as these painted turtles.

A3. CULTURAL AND SOCIO-ECONOMIC RESOURCES

The Alewife study area provides a rich chronicle of the settlement and development of the New England coastal landscape, with many sites of historical interest and significance. The Reservation provides recreational opportunities to surrounding communities and is ideally located relative to regional bike and pedestrian paths; proximity to public transportation, nearby playing fields and residential developments; and easy access to roads and parking lots. Diverse land uses surround the study area, including commercial shopping districts, industrial and corporate centers, residential communities of predominantly high density, and some public open space. The Alewife Brook Greenway serves as a utility corridor containing gas line easements, telephone lines, and sewer and storm drainpipes (Figure 20 illustrates cultural resources in the Reservation).

More than a dozen citizen interest groups are focused on the Alewife study area. Prevalent issues include, but are not restricted to: reducing flooding and improving water quality, sustaining and enhancing biological diversity within the Reservation, developing educational opportunities for school children and adults, and monitoring and limiting current and proposed future development projects in the area.

OPEN SPACE AND CULTURAL INVENTORY

LEGEND:	
	LIMIT OF PROJECT AREA (APPROXIMATE)
	MDC - OWNED PROPERTY
	OPEN SPACE - PUBLIC
	OPEN SPACE - OTHER
	PUBLIC PARKING
	MBTA STATION
	ACTIVE TRAIN LINE
	PAVED PATH ON MDC PROPERTY
	GRAVEL PATH
	INFORMAL TRAIL
	BICYCLE ROUTE (ON-ROAD)
	MULTI-USE PAVED PATH
	BROOK CROSSING
	ACCESS POINT
	CONNECTION TO OTHER TRAILS
	KEY VIEWS
	FENCE
	AREA OF HISTORIC INTEREST



- AREAS OF HISTORIC INTEREST
- PRE-COLONIAL PERIOD**
1. HIGHLANDS FISHING CAMP
 2. ALEWIFE FISHING WEIR
 3. VILLAGE LOCATION (POSSIBLE)
 4. PERMANENT WINTER FISHING CAMP
- 17th CENTURY**
5. COLONIAL FARMS
 6. BLACK ISLAND GRAZING COMMON
 7. COLONIAL FISHING WEIR
 8. CARTWAY
- 18th CENTURY**
9. BATTLE ROAD BRIDGE CROSSING
- 19th CENTURY**
10. CLAY PITS
 11. FARM
 12. ICE INDUSTRY RAIL
 13. TANNERY BROOK
 14. ALMS HOUSE
- 20th CENTURY**
15. MAJOR HYDROLOGIC ALTERATIONS
 16. LAST VEGETABLE FARM
 17. NOTABLE ENVIRONMENTAL DEBATE
 18. INDUSTRIAL CENTER DEVELOPMENT
 19. ELIOT'S PARKWAY (MDC)

FIGURE 20. This excerpt from a map of cultural resources depicts public and private open space, existing paths, major roadways, parking facilities and historic points of interest in the Reservation and in the southern portion of the Alewife Brook corridor.

B. GOALS AND OBJECTIVES

Along with findings from the Inventory of Resources described above, four Master Planning goals were developed for the proposed restoration and enhancement of the Alewife Reservation and the Alewife Brook. Each of these goals is composed of three or four major objectives, with some overlap among them. Thus addressing one objective will likely address others as well. The ultimate success of restoration efforts will depend on how well these goals and objectives are met. However, it is important to recognize that in some areas the goals may go beyond the limits of the study area itself.

Meeting Goal 1 requires involvement by neighboring communities outside the bounds of the study area. For example, cities and towns should decrease their pollution (especially fecal coliform bacteria) from combined sewer and stormwater overflows by eliminating cross contamination and illegal connections to storm drains. Pollutants washed from parking lots and lawns by stormwater should be reduced or eliminated through low impact development (LID) techniques, e.g., substituting infiltration

Goal 1: Improve water quality and restore natural hydrology

Objectives

- Protect existing and increase future storage capacity of stormwater runoff to reduce threats of flooding.
- Decrease pollution from combined sewer and stormwater overflows.
- Decrease nonpoint sources of pollution from stormwater runoff by implementing traditional and innovative best management practices (BMPs).
- Re-establish a more stable and natural stream geomorphology.

Goal 2: Protect and enhance wildlife habitat

Objectives

- Improve migratory and spawning habitat for anadromous fish, especially alewife — the namesake species for the entire region.
- Enhance and expand aquatic and riparian habitat for birds and mammals.
- Protect and expand ecological connections to surrounding, non-MDC, open spaces with a broadened habitat perspective.
- Manage the study area to enhance species and habitat diversity.

swales for curbs, gutters, inlets, and drains wherever possible. Placing development limits on the creation of impervious surfaces will maintain stormwater infiltration and enhance the flood storage capacity of the Alewife area.

Goal 2 also requires efforts that extend beyond the specific recommendations for the study area described in Section 2D. For example, enhancing habitat for migratory birds depends in part on acquiring and protecting abutting wetlands and upland areas. Where protection is not possible, ecologically sensitive development is critical.



FIGURE 21. The Master Plan recommendations will provide opportunities for students to learn ecology lessons through first hand experience at the Alewife Reservation.

Goal 3: Improve recreational, educational and cultural opportunities

Objectives

- Facilitate public use of the Alewife Reservation and Alewife Brook Parkway.
- Increase stewardship of the Reservation by users and other stakeholders.
- Interpret ecological and cultural history from the time of the Great Swamp to today's relict wetland ecosystem.

Recommendations to improve public use of the Reservation and Greenway are presented in Sections 2C and 2D.

There is a recognized need for the MDC to work with abutters, concerned citizens, and interest groups. Citizen-based monitoring and stewardship programs managed and coordinated by the MDC should be encouraged and enhanced to ensure progress implementing the Master Plan. Creative means for obtaining on-going funding for restoration and maintenance need to be explored that will maximize environmental involvement and stewardship by surrounding industries and businesses.

Goal 4: Provide for maintenance that minimizes costs and maximizes effectiveness

Objectives

- Create a low-maintenance, long-term, self-sustaining landscape.
- Implement MDC-managed citizen-based monitoring and stewardship program.
- Identify sources for funding and partnerships for implementing the Master Plan.
- Properly fund and staff the Reservation.



FIGURE 22. Small platforms connected to boardwalks will enhance wildlife viewing in the Alewife Reservation.

C. PROPOSED SITE IMPROVEMENTS AND AMENITIES

Many of the site improvements and amenities described below are closely linked to each other in their function and have been combined in the design. Together, they are designed to reflect the comprehensive goals set forth in this plan, resulting in improved connections for water, wildlife, and people. For better understanding of recommendations described herein, refer to the fold-out Master Plan drawings in Appendix E.

The following paragraphs describe general improvements and treatments but also give an overview of the site program. For more detailed location descriptions for each area, refer to Section 2D.

C1. GENERAL DESIGN CRITERIA

In developing this Master Plan, the planning team established basic design criteria for site improvements and amenities to ensure that the goals and objectives set forth in the Master Plan are reflected in the individual site program elements. These criteria are as follows.

- Incorporate innovative stormwater management techniques into infrastructure design.
- Create a network of wildlife habitat and plant communities using native species.
- Concentrate wider, primary pathways along Alewife Brook and the Parkway. Leave the Reservation for passive recreation with minimized disturbance in sensitive wildlife habitat areas.
- Include educational components, for example, highlight natural and cultural processes through innovative design and exposed infrastructure.
- Integrate educational, interpretive, and directional features with public art.
- Use sustainable and recycled materials where possible (refer to the List of Sustainable Materials in Appendix C).

C2. HYDROLOGICAL AND HYDRAULIC IMPROVEMENTS

Major, sustainable improvements to current problems like flooding of abutting homes and businesses and impaired water quality can only be achieved on a watershed scale, and strategies for those planning efforts are discussed in Section 4B of this Master Plan. However, as water remains the driving factor for life and restoration plans around the Little River and Alewife Brook, many of the site improvements described in this section take water into account. The alterations that resulted in today's hydrologic



FIGURE 23. Flooded former ADL parking lot in the Reservation.

and hydraulic conditions were severe, therefore many of the improvements listed below must be regarded as long-term actions, potentially requiring more extensive studies, modeling, and close evaluation regarding their feasibility. Some studies are currently underway, such as the MDC Mystic River Hydrologic and Hydraulic Study.

Recommended hydrological and hydraulic improvements are as follows:

1. Increase flood storage volume through dredging of ponds and stream channels. This action must be closely linked to a comprehensive strategy to eliminate re-sedimentation from watershed inputs to the system to ensure long-term success. Potential aquatic habitat impacts must be carefully studied and minimized.
2. Increase flood storage volume by lowering floodplain elevation, e.g., through wetland creation and removal of fill material.
3. Eliminate structural constrictions by widening bridge openings and culverts.



FIGURE 24. This stream channel is being restored using bioengineering techniques. These techniques, originally developed in Europe, combine mainly natural materials such as native plants, coconut fiber mats, and rock. They have proven very successful in restoring natural systems.

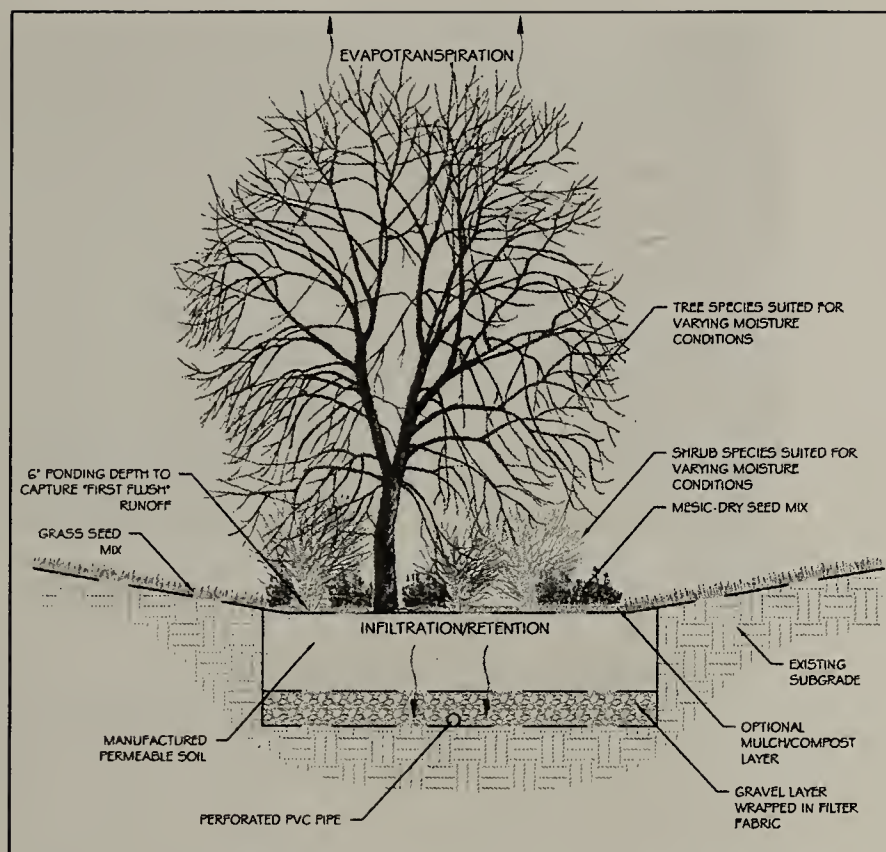


FIGURE 25. Typical bioretention basin for stormwater infiltration and water quality treatment.

4. Realign the stream channel and alter cross sections to achieve a more balanced sediment transport regime.
5. Decrease sedimentation in streams and ponds by stabilizing eroded banks with bioengineering techniques.
6. Improve water quality by enhancing buffer areas, especially using native herbaceous plant communities on stream banks and pond edges.
7. Incorporate innovative stormwater management techniques such as biofiltration basins and stormwater wetlands to improve water quality and decrease water quantity entering the stream system during storm events. These actions must be combined with similar efforts in the entire watershed if a measurable improvement is desired.
8. Achieve a water quality of Class B or better within the Alewife watershed to expand the possible uses of the water bodies to fishing and contact recre-

ation. This effort requires regional planning efforts that focus on the entire watershed (see Section 4B, Recommendations Beyond Study Area). Currently the Little River and Alewife Brook are classified as Class B (swimmable, fishable) streams, but the current water quality does not fulfill the parameters set for a Class B stream and the official process for downgrading the status to the subcategory Class B, CSO is currently underway.

C3. HABITAT RESTORATION AND ENHANCEMENT

Despite the currently impaired habitat quality, a variety of wildlife is commonly found in the project area and has been identified in recent studies and through observations.

However, the remaining habitats are in need of protection and improvements to strengthen the desired wildlife communities already present and to improve the conditions for species currently under-represented, such as blueback herring and alewife. These improvements are expected to result in higher population numbers, higher species diversity, domination of native species over exotic intruders, and better connections between isolated habitats.

Recommended habitat improvements are as follows:

1. Improve habitat for wildlife already using the Reservation and increase habitat diversity to accommodate a greater variety of species. Priority should be placed on improving and enhancing wetland habitats, including forested wetland, the aquatic habitat of ponds and stream channels, riparian habitat along the stream banks, wet meadows and swamps, and vernal pools. Increasing fragmentation should be avoided, rather - habitat areas should

be consolidated into larger, contiguous areas where possible. Upland forest is extremely limited in the Reservation, but it is needed to provide habitat diversity and to provide refuge to some species when flooding is extensive. Priority should be placed on preserving abutting upland parcels as natural areas.

2. Improve the soil by amending existing soils to support healthy vegetation, importing “clean” soil (free of weeds, exotic plant parts and seed), and manufacturing a “new soil” from various individual components, especially for use in bioretention/biofiltration areas.
3. Remove exotic species with low wildlife value and replace with noninvasive native species selected for their potential resource value for nesting, food supply, etc. (see the Maintenance Plan in Appendix D and Plant List in Appendix B).
4. Link habitats of vegetative communities by removing invasive plant species and adding native plantings.

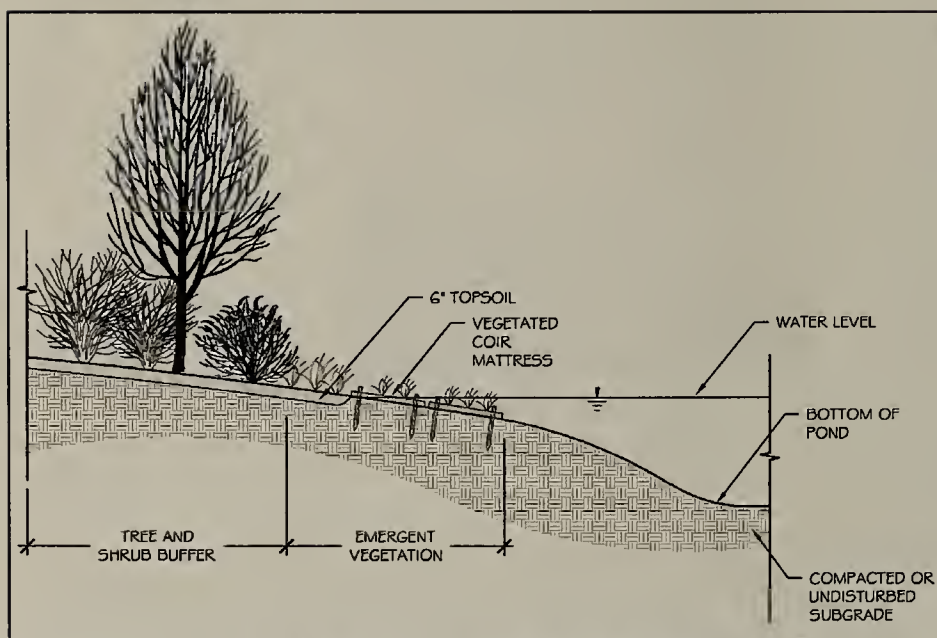


FIGURE 26. Typical emergent pond edge treatment replacing lawn areas, improving habitat diversity, and cleansing water.



FIGURE 27. Meadows serve as habitat for insects such as bees and butterflies, as well as for ground-nesting bird species.

5. Reduce mown lawn areas by adding pockets of upland meadow along the Alewife Brook and Parkway.
6. Replace lawn areas leading up to the water's edge with an emergent plant zone and riparian vegetation to discourage use by Canada geese.
7. Increase flood storage through excavation of the newly created or restored wetlands. Assess feasibility of excavation by testing soils to determine soil contamination from past industrial use and dumping.
8. Design natural areas/habitats to improve water quality by using native plants, especially herbaceous species, that in combination with soil and microorganisms can filter pollutants from the water. Re-grade pond and river banks and shape the channel profile in restored stream sections to encourage the establishment of a herbaceous plant shelf in contact with the water.
9. Decrease sedimentation in streams and ponds by stabilizing eroded banks.

10. Design habitat areas for increased stormwater infiltration by removing existing pavement, adding new native plantings, improving soil conditions (for example, deep tilling in heavily compacted areas, adding of compost and other soil amendments), and importing or manufacturing new soil.

C4. CIRCULATION AND ACCESS IMPROVEMENTS

Gateways and Entrances

The Master Plan proposes two major gateways that will serve as the primary access to the Alewife Reservation and Alewife Brook Greenway. The major gateway into the Reservation will be located just northwest of the Alewife Subway Station and adjacent to the Minuteman Bike-way terminus. This area is currently used as the entry point for most Reservation visitors. An information kiosk exists at this entry.



FIGURE 28. This gateway to the Upper Charles Reservation is an example of possible gateway design for the Alewife area.

Obelisks similar to those found at the Minute-man terminus will signal the gateway for the Reservation and the connection to the Fitchburg Cutoff Bicycle Trail, a proposed multi-use trail that the Massachusetts Highway Department (MHD) will construct on the southern edge of the Alewife Reservation. Reservation users crossing a new bridge over old Alewife Brook could orient themselves to the Reserva-

tion's rich ecological and recreational history at a new, nearby gathering area. Teachers and naturalists will use the outdoor amphitheater to educate students and other visitors on subjects ranging from birds of prey to wetland systems.

The second major gateway will be located at the northern end of Alewife Brook where it connects to the Mystic Valley River. The Alewife–Mystic Gateway Park will help link these two linear open spaces.

Amenities at the gateways will include seating areas to serve as a gathering point or outdoor classroom, information and directional displays, interpretive and educational signage, and public art. The gateways could also include water fountains and public restrooms. Field and trail guides should be available at these locations.

Several other minor gateways have been identified in the Master Plan including the Reservation access at Brighton/Blanchard Street, the restored east Reservation wetland as well as the Massachusetts Avenue and the Broadway bridge over Alewife Brook. They will incorporate signage, a kiosk/information board to provide general information, trail guide, and interpretive features, and parking (where necessary). Neighborhood residents abutting the park can access the path system in other MDC designated locations, such as at Little Pond and along both sides of the Alewife Brook and Parkway.

Parking

Vehicular parking at Dilboy Field will remain. The existing MDC parking lot there is proposed to be retrofitted or re-built using stormwater best management practices such as infiltration swales and biofiltration areas. These slightly depressed, vegetated areas receive runoff from paved parking surfaces and temporarily store the water above ground, in the soil and in subsurface drainage layers. Biochemical and



FIGURE 29. A biofiltration area in a parking lot.

physical processes would improve the quality of the water before it enters Alewife Brook. A significant amount of the stormwater runoff would return to the hydrologic cycle by means of evapotranspiration through the plants and the soil medium.

The proximity of the Alewife MBTA parking garage to the Reservation provides a good parking option for park users. However, the garage fills up quickly on weekdays with commuters. Parking spaces are more readily available on the weekends and after the afternoon rush hour.

Several new, small parking areas (5 to 20 spaces) are planned to reduce the dependence on the Alewife MBTA parking garage. They are: off Acorn Park Drive near the Belmont Uplands; adjacent to the wetland restoration at the former ADL parking lot; and at Brighton Street to serve people accessing Little Pond. These new parking areas should incorporate biofiltration and porous pavement that allows infiltration of stormwater into the underlying soil for groundwater recharge. Bicycle racks should also be provided for those who want to access the Reservation by nonmotorized transportation.

Public Transportation

The Alewife Reservation is accessible to public transportation (e.g. Alewife subway station and connecting bus routes), however, additional signage is needed to direct visitors to the Reservation gateway. The location of the Alewife subway station presents a great opportunity for people to reach this “outdoor classroom” by means of an environmentally friendly mode of transportation.

Circulation Patterns and Connectivity

The primary goal of the proposed circulation system is to establish appropriate connections to existing trails, eliminate inappropriate trails and develop links to the existing regional path system (e.g. Minuteman Bike Trail). The circulation and path system balances the protection of wildlife habitat with the public’s desire to observe and appreciate it. Where feasible, paths have been located on higher ground in the least-sensitive areas. Paths leading through sensitive areas or wetlands will be constructed as boardwalks. Areas currently disturbed by filling and dumping activities or infested with exotic species will be properly rehabilitated in future advanced design stages. Examples of such areas include pieces of land south of Little River and along Alewife Brook.



FIGURE 30. Photosimulation of a bridge crossing to allow for loop trails and better connections.



Figure 31: Existing circulation in Alewife Reservation. Numerous informal trails cut through the area north and south of the Little River.



Figure 32: Proposed circulation in Alewife Reservation. The proposed circulation system retains some of the routes of existing trails but converts them to boardwalks to protect sensitive wildlife areas and keep visitors from venturing off the path. Most of the informal trails south of the Little River will be closed using extensive native plantings (thorny species). The proposed paths and boardwalks allow for loop walks, especially in the East Reservation where educational features will enable the area to serve as an outdoor classroom.

The narrow stone dust path that runs along southern edge of the Reservation, also known as the Fitchburg Cutoff Bicycle Trail, is partially located on MDC land. The MHD is planning improvements to that path to provide adequate width and surface. This path will connect to the Minuteman Bike Trail at the Alewife subway station and travel to Brighton/Blanchard Street in Belmont. It will be an important part of the Massachusetts Central Rail Trail (Wayside Section) that is envisioned to span east to west through the entire state. Through the Minuteman Bike Trail, the Fitchburg Cutoff Trail will connect to the proposed Alewife Brook Trail parallel to Alewife Brook through the Greenway and join the Mystic Valley corridor trail system. The major path connection node for the area is conveniently located adjacent to the Alewife subway station. At this location, the proposed paths mentioned above, the Minuteman Bike Trail, and the Linear Path meet existing and potential connections to the Wayside Rail Trail, Fresh Pond, and the Charles River.

The proposed network of trails in the Alewife Reservation focuses on creating several loops that will lead visitors through and around the sensitive wildlife areas using boardwalks and narrow trails. By reducing the existing unplanned network of informal trails, and providing a new high quality path system, negative impact by park users on habitats and animals that live in or use the Reservation will be reduced. Areas where trails will be closed off will be reclaimed for habitat.

The major loop starts at the Reservation gateway behind the Alewife subway station and continues through the area south of the Little River, crossing the Wellington Brook and Little River between Perch Pond and Little Pond. From there, the path runs east along the northern edge of the Reservation, keeping the area along the river undisturbed for wildlife activity.

A smaller “educational” trail adjacent to the Alewife subway station incorporates the proposed wetland restoration site in the east Reservation and the proposed stormwater wetland on the south side of the Little River, via a narrow pedestrian bridge. Small platforms, overlooks, and some interpretive features make this smaller loop trail a central focus area for an outdoor classroom.

Trails leading along the edges of Little Pond allow neighbors to access the west Reservation from two points along Brighton Street. A small pedestrian bridge across Little River near Little Pond allows circulation into the areas north of the Little River. The trail alignment in these areas is closely linked with shoreline restoration and riparian habitat enhancements around Little Pond.

Path Types (Width & Surface Material)

Four path types of varying widths and surface material are recommended for the project area. The different types were selected based on anticipated type of use, user frequency, accessibility, and sensitivity to the area where the path will be located. All pathways in the Reservation and along the Alewife Brook are designed primarily for pedestrian and bike traffic. Vehicular traffic (light vehicles such as pick-up trucks) will be necessary on selected paths for maintenance and public safety purposes. Those paths include the trail on the southern edge of the Reservation (Fitchburg Cutoff Trail) as well as the pathways on the west and east side of the Alewife Brook. These paths will be designed to accommodate heavier loads, and collapsible bollards or other appropriate means will prevent access by unauthorized vehicles. There will be path sections with structural limitations that will prohibit maintenance access like the cantilevered path parallel to St. Paul’s Cemetery on the east side and the proposed ramp off Broadway on the west side of the brook.

Asphalt Path

Asphalt (bituminous concrete) is a hard surface that accommodates pedestrians, bicycles, wheelchairs, strollers, and in-line skates. Asphalt paths can also be designed to withstand emergency and maintenance vehicles. The generous width of these paths (10–12 feet) allows for two-way traffic.

Generally the asphalt surface is impervious, but porous formulations are available and can be useful in decreasing runoff. Biofiltration swales parallel to the path or leading from the path to larger biofiltration basins will also be used to retain and treat stormwater. This configuration is suitable along the Alewife Brook Parkway to improve or replace the existing sidewalks.

Stabilized Aggregate Path

This path type is 8–10 feet wide and uses stone dust, crushed stone aggregate (or decomposed granite) and an organic binder to create a semi-porous, stable surface. The path surface is accessible to wheelchairs. The path is semi-permeable and thus most desirable from a stormwater management standpoint. The path usually blends in well with the natural environment. Successful installations of this material type occur on the Minuteman Trail (see Figure 33) and on certain sections of the Fresh Pond Perimeter Trail.

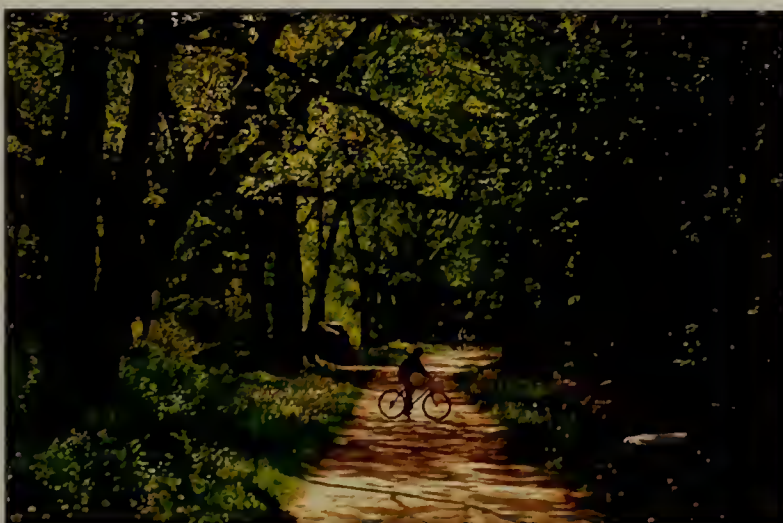


FIGURE 33. A stabilized aggregate path (Minuteman Bike Trail, Concord-Lexington)



FIGURE 34. A stabilized aggregate trail in a natural area.

Stabilized Aggregate Trail

This minor path type is 4–6 feet wide and uses the same surface as described above. It is proposed mainly in the Alewife Reservation where passive recreational activities such as wildlife viewing are common. This path type will provide access while minimizing negative effects on the environment (see Figure 34).

Boardwalks

Six- to eight-foot wide timber boardwalks are proposed in areas where the following conditions occur: in wetland and floodplain areas where impacts to wildlife habitat should be minimized; when the desired path is to be constructed above a certain flood elevation;



FIGURE 35. Cantilevered boardwalk on a steep slope using pin-type footings on downhill side.

and when paths are proposed on a particularly steep slope or where a significant grade change needs to be accommodated. Boardwalks closer to the ground (up to 2.5 feet) will have timber guards to minimize straying or falling off the edge, while boardwalks higher than 2.5 feet require railings. In sensitive areas, pin-type footings will be used to mitigate impacts to the existing resource area (see Figure 35).

Benches and small viewing platforms can be built into the boardwalks to provide improved opportunities for wildlife viewing and scenic overlooks. Recycled plastic and pressed wood products are preferred building materials to pressure treated wood for their longer life span and to avoid toxic chemicals from the wood treatment process leaching into the surrounding soils. An alternative to timber decking is corrosion-resistant metal mesh, which would allow maximum light penetration beneath the boardwalk/overlooks. This type of decking could be used over channel inlets designed for fish migration into the newly created open water wetlands.

Bridges, Overlooks and Crossings

Along Alewife Brook Parkway, vehicular bridges cross Alewife Brook at five locations: the Route 2 rotary at the beginning of the Parkway, the intersections with Massachusetts Avenue, Broadway, Henderson Street, and the Mystic Valley Parkway. Apart from the crossing at the end of Henderson Street which serves as a neighborhood connection, all of these bridges experience heavy traffic and accommodate pedestrians only with a narrow sidewalk. It is from these bridges that one can obtain the best view into the stream environment. These views will be maintained and may be improved (e.g. added safety measures in these locations, cantilevered platform at an existing bridge, etc.).

The existing bridges should also be used to link proposed paths by installing proper crossings

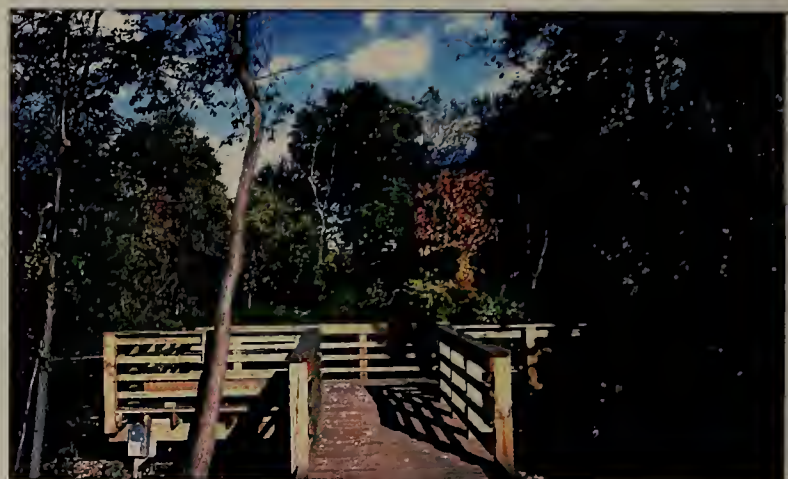


FIGURE 36. Example of a small platform that could be used on the edge of the Little River.

and directional signage. Crosswalks over roadways should be clearly marked and pedestrian lights installed to ensure safe travel and connection between the path segments. The use of different paving materials can be used as another measure to signal upcoming intersections and crossings.

No additional vehicular or pedestrian bridges are currently proposed for the Alewife Brook and Parkway section of the project area. However, pedestrian bridge crossings at Dilboy Field and over the Mystic–Alewife confluence at the Mystic Valley Parkway were discussed in the master planning process and could be revisited in the future if adjacent neighborhoods expressed a strong interest.

New pedestrian bridges are planned for key locations in the Reservation. These bridges will enhance accessibility and public safety, connect trails to form loops, and provide better views into wildlife areas.

The proposed bridge behind the Alewife subway station over old Alewife Brook must be wide enough for emergency and maintenance vehicles (minimum 12 foot width). All other proposed bridges will vary between 6 and 8 feet in width and will be designed to carry non-vehicular loads. The bridges will be constructed using a mixture of recycled materials, wood and metal, and will be designed to have minimal impact on wildlife. Prefabricated systems

are desirable to minimize costs. Design constraints such as flood elevations will be taken into consideration during design development.

Small platforms and decks integrated into the system of boardwalks will create new scenic views into the restored wetlands and the Little River. Subtle interpretive features will provide opportunities for learning about the history of the Great Swamp, area wildlife, and important ecological functions of this urban ecosystem.

C5. LANDSCAPE FURNISHINGS

The Alewife Reservation and Alewife Brook corridor differ noticeably in character. The Reservation is a contiguous open space that functions primarily as a natural area, whereas the Alewife Brook and the Parkway form a linear urban park. The Master Plan not only strives to make the connection between the two more effective and visible but also to improve and maintain their respective qualities. Landscape furnishing can help by creating a unifying character of the space.

Light fixtures typical for the MDC Parkways are proposed along the road edges of the Alewife Brook Parkway to strengthen the Parkway character. The historic lights could also be furnished with a smaller scale light fixture to illuminate the asphalt path parallel to the brook and road. The use of light fixtures that minimize light pollution through cutoff reflectors is also encouraged.

Benches in the Reservation will be provided in the form of structures built into boardwalks and overlooks creating a different character and quality. Standard benches can be used along the MHD Bike trail to provide a continuous connecting element for the users. A modification to the standard MDC bench incorporating sustainable materials links the past to the future.

Carefully selected locations along the Alewife Brook corridor will receive standard MDC

benches inviting travelers for a short rest to enjoy the park and brook.

Bike racks should be installed in the vicinity of the intersection between the Alewife Brook Parkway and Massachusetts Avenue, as well as at the Broadway intersection, to accommodate bike commuters who switch to bus transportation in these locations.

A carry-in/carry-out strategy clearly stated on signs in prominent locations is proposed for trash handling to help increase the awareness for environmental pollution. An increase in users and patrolling by MDC rangers and park police will help to eliminate large-scale dumping. Any trash receptacles placed at major gateways should be easily accessible to maintenance vehicles.

C6. INTERPRETIVE FEATURES AND SIGNAGE

Three major themes derived from the history of the Alewife area can serve as the basis for developing interpretive features:

1. past (industrial and agricultural), present and future land use,
2. changes to the natural system and ecology of the area, and
3. Native American history and settlements.



FIGURE 37. This etched boulder calls attention to the species and other natural elements of a site.

Interpretive features should be subtle, low maintenance, easy to change in response to varying program requirements, and accommodate short- and long-term objectives (e.g., expansion of trails along the Mystic River or other connected areas of interest).

Rather than a large number of interpretive signs that could be subject to vandalism, numbered identification markers at various points of interest will relate to an interpretive guide available at all gateway areas. Where signs are used in prominent locations, they should be designed to be durable, nonflammable, and cost-effective for replacement.

C7. PUBLIC ART

The Master Plan envisions using art as an element of public education and for creating visual connections between spaces and habitats that are not readily apparent to the traveler. Interpretive elements incorporating art and lo-



FIGURE 38. This art installation made from natural materials also functions as an entrance and play area.

cal artist's visions, similar to those found at the new Fresh Pond facility, are also desired.

Temporary installations might celebrate seasonal events such as the spring herring run. Natural materials found on-site, such as (willow) twigs, branches, or vines, might become the basis for transient art or play installations. Permanent installations would be placed in prominent locations. Collaborations of artists with local activist groups, residents, school



FIGURE 39. An ecological mural is proposed for the Alewife subway station.

children and businesses can help foster an understanding of the natural and cultural world and enhance the human connection to the wildlife found in the Reservation and the Greenway. A project in this spirit is an environmental mural proposed to adorn the walls of the Alewife subway station. Fundraiser events such as the one organized by the Friends of the Alewife Reservation in November 2002 for the mural are good examples of what can be done to spark interest and help raise some of the necessary funding.

C8. WATER ACCESS

A key element of the Master Plan is to provide opportunities for users to experience water in new ways. Structural obstacles, including the chain link fence along the Alewife Brook, should be removed to allow for visual access to the any restored sections of the brook. To limit



FIGURE 40. Representation of a possible boat access area

the negative impact on the ecosystem, access areas along the Little River and Alewife Brook should be small in scale and well defined.

Many of the site amenities described in this section, including overlooks, platforms, and boardwalks, make access and views to sensitive aquatic areas possible.

Nonmotorized boating is a popular activity that can be facilitated by improved access to the water. New access points for nonmotorized boats are incorporated at Little Pond, the proposed wetland in the east Reservation (current ADL parking lot), and the Dilboy Field parking lot, expanding the routes for canoes and kayaks to travel to the Mystic River. Boat launches will be designed to blend with the surrounding environment (e.g., using cobbles and stone placements to define the launching spot). Stairs leading down to the water could be marked with the flood levels as an educational feature.

The expected improvements in environmental health and water quality within the Alewife watershed will dictate which types of water activities will ultimately be encouraged. Currently the water quality of the Alewife water bodies is not safe for contact recreation. Therefore, other opportunities for water play should be offered, particularly for children. An underground cistern could store potable water that would circulate through different water features by means of solar- or hand-powered pumps or Archimedes screws. Such water play features could also serve as an important educational element for sustainable water and energy use.

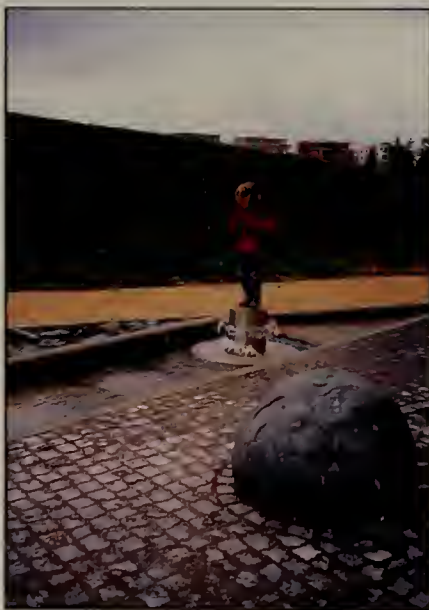


FIGURE 41. Water play

C9. SAFETY AND SECURITY

The planned improvements to the Alewife Reservation and Alewife Brook corridor are expected to increase recreational use and visits to the area. Greater public use will help reduce unwanted, illicit activity that currently takes place in several remote areas. In other words, increased use means increased visibility, which in turn promotes increased safety.

In general, night-time use is not planned or encouraged for the Reservation. MDC policy for public use is dawn to dusk (i.e., closed after dark). Another suggested measure to increase safety is increased patrolling by MDC rangers and state and local police (e.g., bicycle-mounted park rangers).

C10. DELINEATING AND SCREENING THE PRIVATE-PUBLIC PROPERTY INTERFACE



FIGURE 42. Example of boundary treatment between private and public property before (above) and after (below).

Where requested and appropriate, strategic plantings and a low wooden fence will be used to clearly define the line between private and public property at the edges of the Reservation and along the Greenway. Dense plantings of woody native species (see plant list in Appendix B) can screen private abutters from park users, ensuring adequate privacy, and clearly delineating between public and private land. Carefully sited openings in the vegetation and/or fence will maintain desired views and access to open space. A wooden guardrail will be used in areas abutting commercial and industrial properties to define the boundaries of the public open space.

D. AREA-SPECIFIC RECOMMENDATIONS

The fold-out master plan drawing in Appendix E is designed to accompany the descriptions and the recommendations in this section.

To facilitate description of the recommendations in more detail, the project area has been divided into seven areas. For each area a short summary of the existing conditions and a statement of the key challenges is provided, followed by a description of the proposed recommendations. The list of recommendations for each area starts with actions related to Master Plan Goals 1 and 2 and their corresponding objectives (i.e., improve hydrology/water quality and habitat) followed by proposed actions fulfilling Goal 3 (i.e., improve recreational, educational, cultural opportunities).

The typical improvements and site amenities that recur in these project areas are described above in detail in Section 3C. Recommendations that require more extensive studies regarding their feasibility are labeled “long-term recommendations.” These actions would greatly improve the health of the ecosystem but involve extensive planning, funding, and construction.

AREA 1: LITTLE POND

Existing Conditions and Key Challenges

Much of the shoreline of Little Pond has been modified and few aquatic plants are present. Trees and shrubs dominate about one third of the shoreline; residential yards and lawns, most illegally encroaching, line the remaining two-thirds of shore. There is also a loss of natural shoreline from erosion.



FIGURE 43. View over Little Pond from the north

Although Little Pond is reported to sustain some of the few spawning populations of herring in the area, fishing seems to have decreased in recent years, possibly due to a decline in water quality. (Approximately 20 stormwater outfalls drain to the pond, including a large box-culvert receiving significant runoff from the City of Belmont.) Bordering lands harbor a variety of birds and mammals.



FIGURE 44. Existing Little Pond shoreline with lawns leading up to the water's edge.

No trails circumnavigate Little Pond, although the site does serve as a gateway to the Reservation from several access points. No important cultural resources exist in the area.

Recommendations

1. Reclaim all encroachments and restore the riparian buffer and shoreline around Little Pond. The west side of the pond requires intensive restoration using bioengineering techniques and native herbaceous plantings as well as shrubs and trees. Planting trees at specific intervals will maintain views to the pond from the abutting residential homes. The littoral shelf (the lower, mostly flat and submerged part of the pond bank) should be planted with native emergent wetland species able to trap contaminants, which will improve water quality. In addition, native vegetation provides increased habitat, which can lead to greater diversity of aquatic invertebrates and fish. Removing the lawn abutting the pond will help reduce the Canada Goose problem in the area.
2. Determine sediment depths and explore the feasibility of dredging Little Pond. Increasing pond depth will increase flood storage capacity and can also reduce peak summer water temperatures while increasing dissolved oxygen levels (long-term recommendation).
3. Create predator free islands in the pond that could serve as avian nesting habitat. Flexible modular systems that are anchored to the pond bottom are available that allow herbaceous vegetation to become established.
4. Convert mowed grass south of the pond into low-maintenance meadow communities to increase the diversity of habitat types in this area and reduce goose feeding.
5. Install paths at strategic locations to allow for better access to the Reservation and pond edge. The path system will comprise a combination of trails, boardwalks, and small lookout platforms at locations with scenic views (e.g., on the south side near the neigh-



FIGURE 45. Proposed pond shoreline with riparian restoration

borhood access from Brighton Street, at the outlet of the Little River, and on the north side near the neighborhood access from Frontage Road). Access to Little Pond is proposed via neighborhood access points in three locations: two off Brighton Street and one off Frontage Road. Directional signage should be installed in those locations.

6. Install rustic wood benches at key locations along paths and at overlooks.
7. Use porous pavement to create a new ecologically sensitive parking lot (5-10 spots) and access off Brighton Street to serve as a drop-off at the existing MDC dock. Repair and improve the existing dock to allow for easier use as a canoe/kayak launch.
8. Install a wooden fence, with openings if requested by abutters, along the property line and vegetative buffer to delineate public and private space.

9. Reclaim MDC land that has been encroached upon to implement the above recommendations (refer to Section 4F for encroachment solution strategy).

AREA 2: FORMER MDC SKATING RINK

Existing Conditions and Key Challenges

This area includes a dense woodland on the west, a woodland border along the north and east sides, and a central disturbed area that was once an MDC skating rink and associated parking lot. In the woodland on the west, signs of former agricultural activity can be found, such as old apple trees. The central disturbed area is a relatively barren grassland. This area is the only large site within the study area outside the 100-year floodplain. Therefore, it has potential to provide additional flood storage volume. The site is fairly isolated by its location between Route 2, Route 2 access ramps and Frontage Road. It provides no terrestrial habitat connection, although birds are able to reach

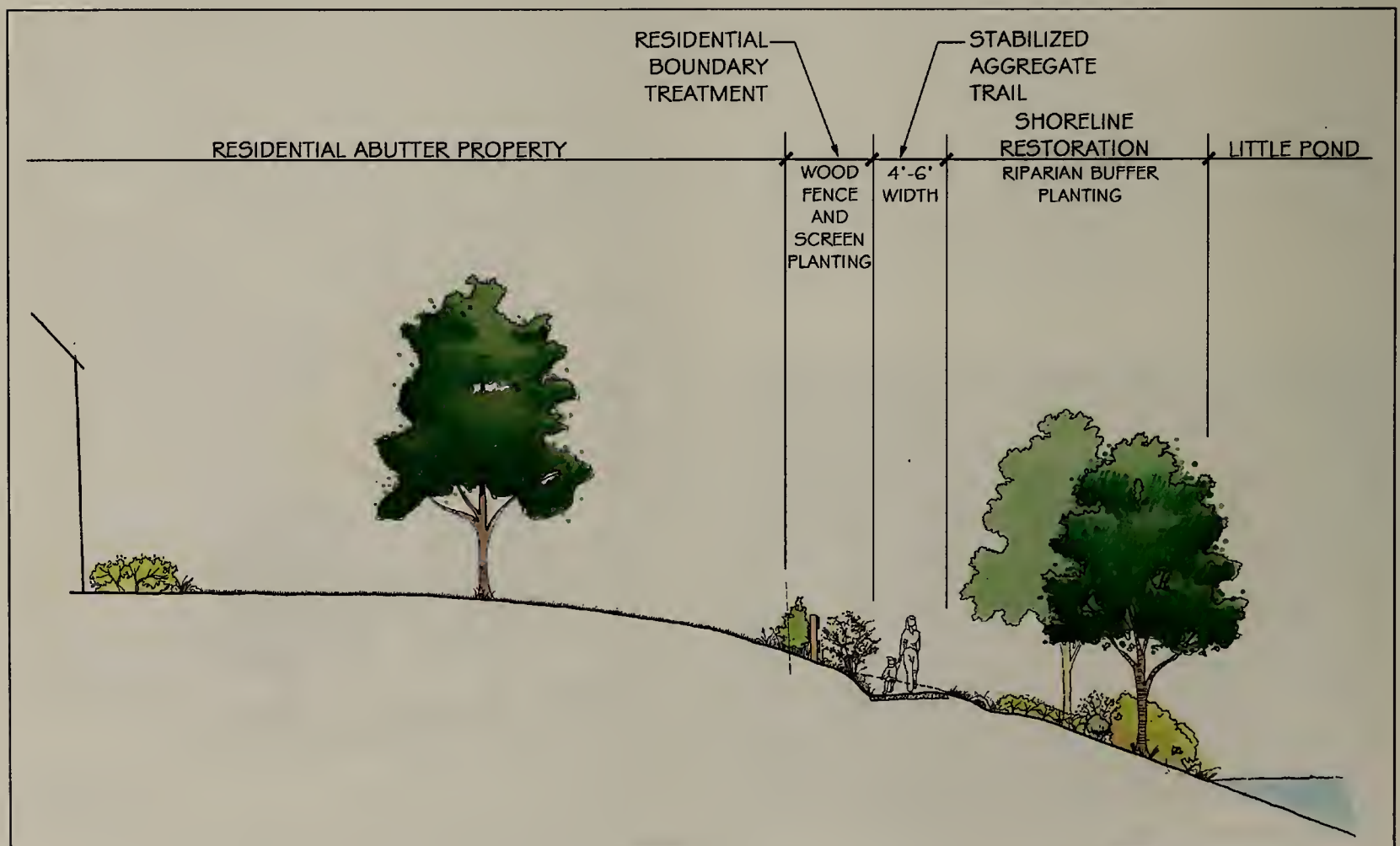


FIGURE 46. Proposed path and public-private property treatment at pond shoreline

the area. Several hydrologic connections via pipes exist. The area received heightened attention over the last two years when the Town of Belmont Recreational Department and the Belmont Hill School were seeking an agreement with the MDC to re-develop this area for playing fields. This project was stalled in 2002 by the Massachusetts State Senate.



FIGURE 47. The former MDC ice rink site is fenced and surrounded by roads and highway ramps.

Recommendations

1. Identify methods for using the area to increase flood storage capacity and estimate cost and feasibility.
2. Manage the site to maintain different habitat types, namely, bordering woodland and open grassland–wet meadow (seasonal flooding).
3. Remove invasive species and plant native vegetation.
4. Remove remnant debris and fabrics that impede development of a diverse plant community.

AREA 3: RESERVATION NORTH OF LITTLE RIVER

Existing Conditions and Key Challenges

This portion of the Alewife Reservation is situated within the 100-year floodplain and much of it is classified as wetland habitat. The banks of the Little River are heavily vegetated with trees and shrubs that shade the water between late spring and early fall. Aquatic habitat structure is limited to woody debris, and numerous



FIGURE 48. This grassland is east of the ADL parking lot.

carp are present. Closed canopy woodlands occur east of Little Pond and west of the Acorn Office Park. A relatively open grass/shrubland with scattered trees is found east of the former ADL parking lot.

Important wildlife habitats include the wetlands and uplands located on the abutting private lands to the northwest of the Reservation, some facing future development. The contiguous open space of the Reservation is broken by the Acorn Office Park complex, a large parcel of developed private land that stretches from near the bank of the river north to Route 2. One storm drain outfall from the Acorn Office Park complex discharges to the river.

A dirt trail runs from the Route 2 access road to the MDC-leased ADL parking lot and then soon disappears near where the property fence comes down to the riverbank. The only cultural site is the former location of the last vegetable farm in the area located near Acorn Park Drive.



FIGURE 49. View of ADL parking lot with bordering wetlands from northwest corner.



FIGURE 50. Concept plan for wetland restoration in the East Reservation

Recommendations

1. Determine the depth of unconsolidated sediment in the Little River and Perch Pond and explore the feasibility of dredging to increase channel depth and flood storage capacity and introduce appropriate bed substrate to sustain invertebrate species fed on by fish (long-term recommendation).
2. Stabilize eroding stream banks with native vegetation using bioengineering techniques such as live stakes and brush layers. Establishing herbaceous communities at the water's edge using pre-vegetated systems should also be incorporated to diversify the habitat structure and improve water quality.
3. Restore wetlands on the former ADL parking lot, including open water,

marsh, and an upland island (see Figure 50). Connect the restored wetlands to the existing wetlands (forested wetland, wet meadow) to the North and the East, and enhance the disturbed portions of the existing wetlands by removing invasive species (e.g., common reed, Japanese knotweed, Tree-of-Heaven) and planting native vegetation. Improve the riparian habitat on the stream banks and in the floodplain areas (see Appendix B for appropriate species). In addition to significant habitat improvements, this new marsh will improve water quality and provide additional flood storage.

4. Expand the drainage ditches that connect the ADL wetland with the Little River to provide a larger open water area that can be used by a variety of

species. Invasive species in this area should be replaced by native plant communities (Refer to Section 3F for management and maintenance recommendations).

5. Identify and certify vernal pools (seasonal pools that are free of fish) east of Little Pond to protect this valuable habitat, especially for amphibians.
6. Remove the fence that currently blocks continuous access to the Little River at the Acorn Office Park complex. Starting with a ramp off the existing sidewalk at the Route 2 access road, install a trail along the river's edge and the newly created wetland at the former ADL parking lot in the eastern Reservation. A bridge over the Little River at the Acorn complex will connect the wetland on the north side of the river with the stormwater wetland on the south side, creating the possibility for loop circulation. A boardwalk through portions of the wetland will join the river trail. West of the Acorn Office Park complex the trail will move away from the river to protect a larger, contiguous habitat area and connect with a trail entering from the Belmont

Uplands. A fork in the trail splits the path with one segment leading along the northern edge of Little Pond and the other crossing the Little River over a bridge to connect to the south side.

7. Provide limited parking off Acorn Park Drive at the trail entrance on the Belmont Upland site and at the end of the road as part of the entrance into the new habitat area. An ecologically sensitive parking area adjacent to the wetland will also serve a boat launch into an open water area connected to the Little River. Small boats such as canoes and kayaks can be carried down steps to access the Little River.
8. Place subtle educational and interpretive signage in key locations explaining the function of wetland systems and their history in the Alewife area.

AREA 4: RESERVATION SOUTH OF LITTLE RIVER

Existing Conditions and Key Challenges

This section of the Alewife Reservation lies mainly within the 100-year floodplain and is classified as wetland habitat. The southern banks of the Little River are heavily vegetated by colonizing shrubs and contain patches of canopied woodlands. Disturbed land, in the form of a mosaic of hummocks, and a flood-protecting berm exist in this area as a result of filling activities from construction of the rail line. This is the largest contiguous stretch of land in the Reservation; consequently, it supports a diversity of wildlife.

The substrate of the Little River consists mostly of unconsolidated muck due to sediment input from sewer pipes. One combined sewer overflow (CSO) discharges into the Little River from the south and another discharges into the old Alewife Brook. Sewer overflow discharges can seriously degrade water quality. In addition,

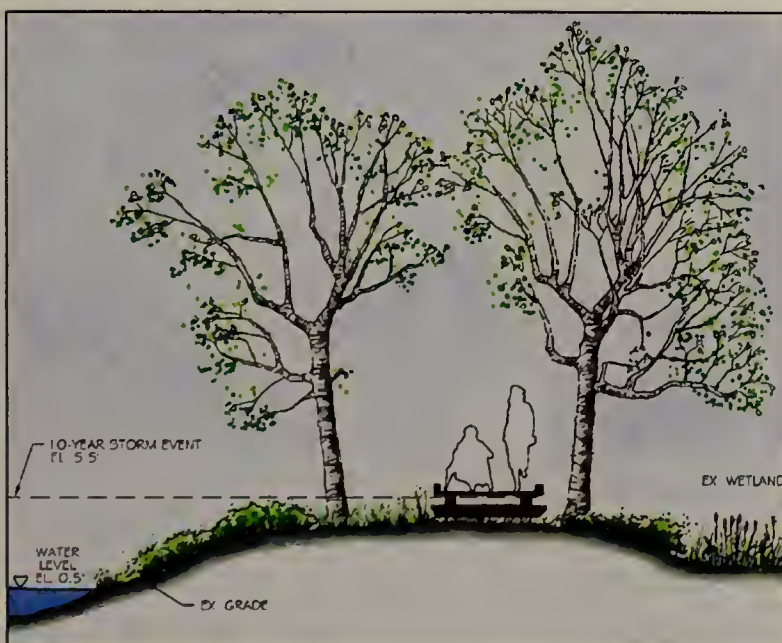


FIGURE 51. A slightly elevated boardwalk along the Little River will allow access even during certain flood events .



FIGURE 52. Grassland and wetland south of Little River.

Wellington Brook, which enters the western portion of the Reservation from Blair Pond, at times carries stormwater contaminated by unauthorized sewer connections.

A sand and gravel pathway that runs west from the subway station to Brighton Street in Belmont borders the entire southern edge of the Reservation. A network of unplanned and overgrown dirt trails leads off this major pathway and penetrates the Reservation south of Little River. An important access point exists at Perch Pond, where a trail makes a dangerous crossing of the rail line to reach Blair Pond immediately south of the Reservation.

Notable cultural resources include the former location of one of the most important farms



FIGURE 53. Existing dirt trail running along the south edge of the Reservation.

in the area, now occupied by the Hill Estates apartment complex, the old ice industry rail line running along the southern edge of the Reservation, and the historic Black Island upland area that served as a Native American hunting camp and as a colonial grazing common, now mostly covered by the Wyeth building (formerly known as the Genetics Institute). Encroachments exist from the apartment complex located near Perch Pond.

Recommendations

1. Stabilize the eroding banks at Wellington Brook to reduce sediment input into the stream system through bio-engineering techniques and enhanced forested riparian buffer.
2. Incorporate an approximately 3.5-acre stormwater wetland adjacent to the existing, delineated wetland in the southeast part of the Reservation (see Figure 54). This wetland is part of the Combined Sewer Overflow Separation project that the City of Cambridge is undertaking with the Metropolitan Water Resources Authority (MWRA) to improve water quality and is described in more detail in Section 4A. The surrounding wetlands are also expected to benefit greatly from this proposed created wetland basin through increased infiltration and temporarily rising groundwater levels. The smaller wetland to the west will feature a large open water area connected to the Little River that will allow fish to enter this protected area for reproduction.
3. Create a major gateway area to the Reservation at the Alewife subway station, incorporating a proposed bridge over Alewife Brook that connects to the planned MHD bicycle path and leads to a public gathering area featuring interpretive and educational elements.

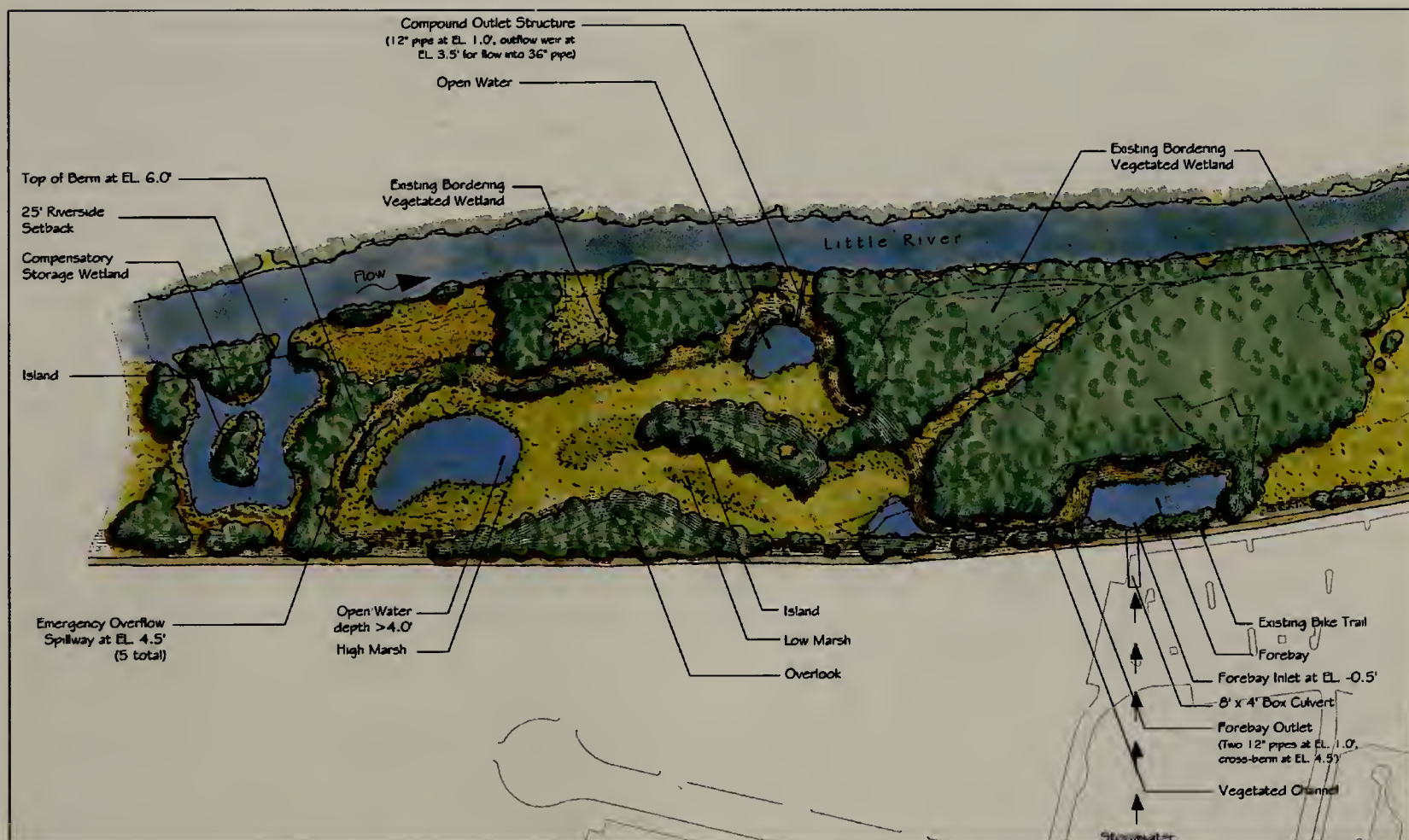


FIGURE 54. Conceptual design of the stormwater wetland. Recreational and educational amenities will be incorporated in the later design phases.

4. Install a circulation system to provide access to key features and allow for pedestrian loops of various lengths. For example, a boardwalk from the gathering area through existing wetlands and down to the river can connect to links through the proposed Cambridge stormwater wetland to the Fitchburg Cutoff Trail, as well as to a proposed bridge across to the north side. Further west, a boardwalk from the path would end in a small, quiet viewing deck. Another boardwalk is proposed leading to Perch Pond and connecting with a bridge over Wellington Brook to a stabilized aggregate trail running between the Little River and Hill Estates apartment complex. This trail would connect to Little Pond and continue with

a bridge across the Little River to the north side joining the trail along the Belmont Upland.

5. Place interpretive/educational signage at strategic locations. For example, signage along the trail leading to Perch Pond could identify former Black Island and historic uses like the railroad and ice industry. At the Cambridge stormwater wetland, information could be provided on the history of this wetland system from the days of the Great Swamp to the present. The trail along Hill Estates could present the agricultural history of this area.
6. Place interactive educational features at strategic locations, such as real-time water quality monitoring boards.

AREA 5: ALEWIFE SUBWAY STATION

Existing Conditions and Key Challenges

This section of the Alewife Reservation occurs within the 100-year floodplain and is classified as wetland habitat. The Alewife Brook, which emerges from its buried pipe to join the Little River near the Alewife subway station, contributes contaminated stormwater runoff and combined sewer overflows. Portions of the Alewife Brook and Little River near the subway station have been armored to prevent further erosion from the storm runoff surges that occur in the area. Yates Pond is infested by both common reed and Japanese knotweed and is entirely surrounded by transportation infrastructure. Stormwater from the subway station parking garage drains to Yates Pond. The location of the subway station, Minuteman Bicycle Trail and nearby recreational fields in both Arlington and Cambridge make this area the most important access point to the MDC parklands. However, Yates Pond is not accessible by any marked trails. The only landscaped portion is



FIGURE 55. Route 2 access road, Minuteman Bike Trail extension and Yates Pond to the right.

the small section where the Minuteman Trail passes through the Reservation along the Route 2 access road. A paved sidewalk runs along the edge of the subway station access road that overlooks Yates Pond, a former clay pit that is an important cultural resource in the area.

Recommendations

1. Remove invasive species and establish native plantings. (Refer to Section 3F for specific management and maintenance recommendations.) Particular attention should be paid to areas along the road so that views of the pond are available year round. Establishing native plant communities, including herbaceous species, can also help to improve the ability of this area to treat stormwater from the Alewife subway station and thus improve water quality.
2. Provide access along Yates Pond with a boardwalk parallel to the sidewalk, providing a safer connection to the Linear Path.
3. Install interpretative signage and educational features. For example, a historic marker could identify Yates Pond as a former clay pit. A real-time water quality monitoring board would inform motorists, bicyclists and pedestrians about the current state of the Alewife Brook and Little River. Public art can



FIGURE 56. Photosimulation of a possible art feature calling attention to the stream and its wildlife for passing motorists.

be incorporated in this area as well, such as a feature creating a visual connection between the Little River and Alewife Brook that disappears here under Route 2 (see Figure 56).

AREA 6: ALEWIFE BROOK BETWEEN ROUTE 2 ROTARY AND HENDERSON BRIDGE

Existing Conditions and Key Challenges

This section of Alewife Brook flows within a concrete trapezoidal channel that is bordered by a chain-link fence, trees, and shrubs, including the invasive Japanese knotweed. Aquatic habitat structure is poor given the absence of a natural substrate that can support in-stream plants. However, the abutting cattail marsh (now colonized by common reed) is home to many birds.

Residences along the Arlington side of the Alewife Brook experience frequent flooding, possibly exacerbated by the hydraulic constriction of the bridge culvert at Massachusetts Avenue. Some encroachments exist here. There are also a dozen stormwater outfalls and two combined sewer outfalls.

This area is a major gateway to the Alewife Brook Greenway, where the well-used Minute-man Bicycle Trail crosses from Cambridge to Arlington, on its way to Lexington. A low-use dirt trail, often overgrown with grasses, winds



FIGURE 57. The Alewife Brook flows in a concrete-lined, straight channel in this area.



FIGURE 58. View over the cattail marsh from the southeast

around the cattail marsh and runs along the western side of the brook to the landscaped Bicentennial Park situated at Massachusetts Avenue. The small dirt path continues between Massachusetts Avenue and the Henderson Bridge on the western side of the brook beside a new hotel and Arlington residences.

A parkland strip of varying width containing mown grass and scattered trees stretches between the tree-lined east side of the brook and the edge of the roadway from Route 2 up to Henderson Bridge. The eastern border of the Alewife Brook Parkway is fringed with trees, residences, a strip of parkland, and a paved sidewalk where encroachments exist.

One cultural feature of note is the Massachusetts Avenue Bridge, which marks the location where British forces crossed the Alewife Brook during their retreat in the wake of skirmishes at Concord and Lexington during the colonial war. Cultural points of interest between the Massachusetts Avenue Bridge and the Henderson Bridge include the historic North Cambridge Alms House on the eastern edge of the Parkway and an inflow that marks the remains of Tannery Brook, a site where the colonial leather-finishing industry developed and where a fishing weir had been used by both colonists and Native Americans.

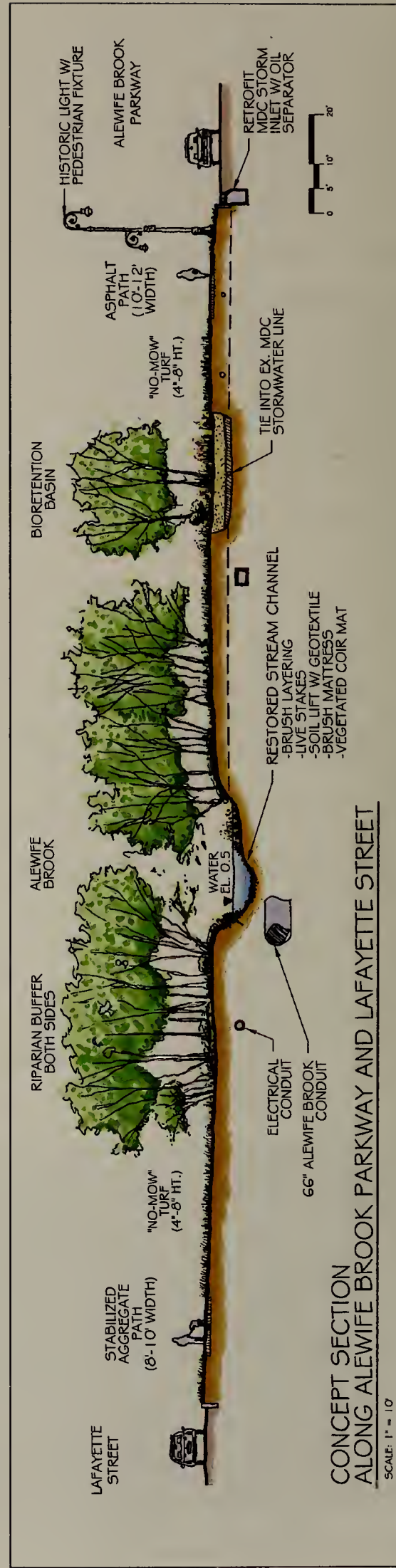
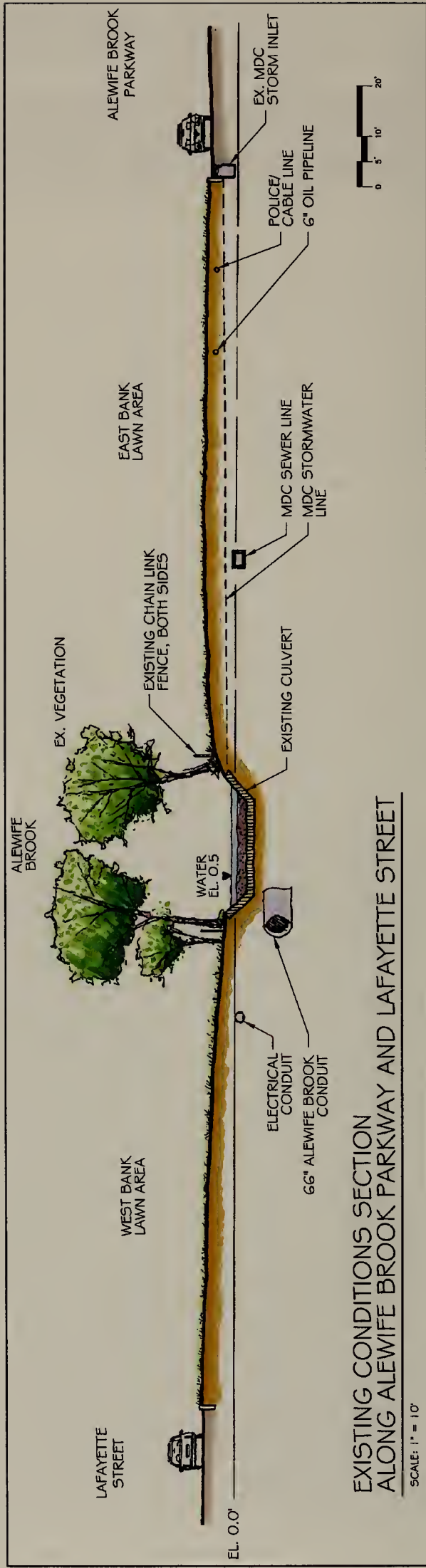


FIGURE 59. Existing (top) and proposed (bottom) conditions along the Alewife Brook Parkway and Lafayette Street

Recommendations

1. Restore the cattail marsh as an ecologically valuable wetland. Remove the invasive common reed (*Phragmites australis*) and establish different habitats including open water, high marsh, and low marsh. Investigate the feasibility of excavation to increase flood storage capacity of the wetland. Create a riparian buffer to increase the diversity of flora and fauna and contribute to the treatment of incoming stormwater. In addition, creating an open, natural channel connection from the marsh to Alewife Brook would provide potential spawning habitat for alewife and blueback herring in the restored marsh. This area is only partially owned by the MDC. The City of Arlington owns the remaining piece necessary to complete the path connections. Land acquisitions in this area or a joint effort for a restoration concept including the different owners are possibilities (Refer to Section 3D). (long-term recommendation)
2. Investigate the feasibility of removing the concrete lining of the Alewife Brook stream bed and banks and restoring a natural channel. If this action is determined to be feasible, replace the concrete trapezoidal channel with a natural channel of varying depth and channel bed composition. Natural bed material can reduce peak summer temperatures and provide beneficial substrate for aquatic organisms. Employ bioengineering techniques to restore vegetated banks and herbaceous vegetation at the stream's edge and create an extended riparian buffer in the floodplain. Increased diversity of riparian vege-

tation will provide habitat variation for bird species. Increase channel sinuosity to allow for stable transport of channel discharge and sediment (long-term recommendation).

3. Selectively remove exotic species in riparian areas and replace with native plant communities (refer to Appendix B for appropriate plant species).
4. Incorporate biofiltration areas into the park design to treat stormwater runoff from the Alewife Brook Parkway road surface, which is currently discharged untreated into Alewife Brook. Combined with grease and oil separator units that would pre-treat the runoff and discharge it into the vegetated biofiltration area (see Figure 59, Proposed Section) this recommendation could help improve the water quality of the Alewife Brook. Vegetated swales will also be used to capture and treat runoff from the asphalt path.
5. Replace the mown turf grass along the Parkway and Alewife Brook with a low-maintenance, tall-fescue grass mix and seed selected areas with a meadow mix to diversify the habitats in this area (refer to Appendix B for seed mixes).

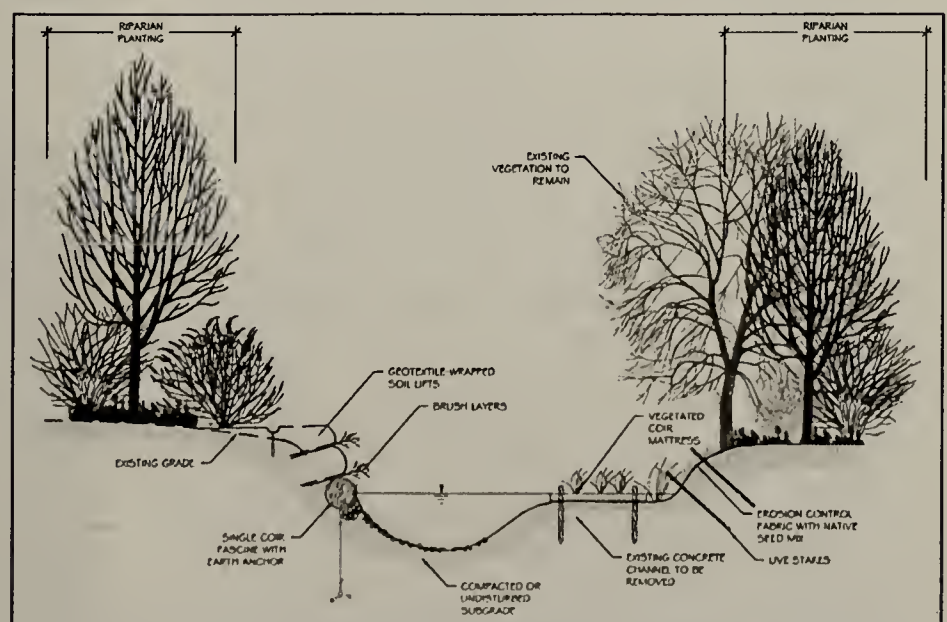


FIGURE 60. Typical stream channel restoration using bioengineering techniques.

6. Remove the fence along Alewife Brook to allow for better visual access. Naturalization of the banks will eliminate the safety hazard of the current steep, concrete banks.
7. Enhance circulation along both sides of the Alewife Brook and create a link to the Minuteman Bike Path. A small portion of this proposed link is located outside the MDC property and must be coordinated with the City of Arlington, the landowner of this parcel. This path leading around the cattail marsh will split at the beginning of the Alewife Brook corridor, continue on the west side up to Henderson Bridge, and cross via a bridge over the Alewife Brook to connect to the east side. On the east side, the existing sidewalk will be replaced or enhanced by a 10- to 12-foot-wide asphalt path, while on the west side, an existing dirt path will be replaced and re-aligned with an 8- to 10-foot-wide stabilized aggregate path that will wind through grass, meadow, riparian, and forested areas, with views of the stream.
8. Improve the Massachusetts Avenue–Alewife Brook Parkway intersection to serve as a gateway to the Alewife Brook corridor. Incorporate directional signage and traffic light controlled crossings for safe travel. Access to the parkland of the Alewife Brook corridor is also possible via multiple neighborhood access points along the east and west side.
9. Prune vegetation at bridges to allow for scenic views (Refer to Section 3F for specific management and maintenance recommendations).
10. Improve the Parkway character by installing typical MDC lights along the road and smaller light fixtures along

the asphalt path. Supplement tree plantings on both sides. Seed remaining open areas with a low-maintenance fescue grass mixture. Replace the granite curb defining the road edge where necessary.

11. Incorporate Bicentennial Park and Massachusetts Avenue Bridge history into an interpretive program. The historic location of a Native American fishing weir between Massachusetts Avenue and Henderson Bridge is another point of interest that would allow for interpretation.
12. Reclaim MDC land from encroachments to implement the above recommendations (refer to Section 3F for encroachment solution strategy).

AREA 7: ALEWIFE BROOK BETWEEN HENDERSON BRIDGE AND BROADWAY

Existing Conditions and Key Challenges

This section of the Alewife Brook flows within a rectangular concrete channel squeezed between St. Paul's Cemetery and the Alewife Parkway and is lined on both sides by a metal railing. Both the concrete structure and railing are degraded and in need of repair. In-stream habitat structure for sustaining aquatic resources is almost nonexistent. Between Massachusetts Avenue and Broadway, 20 storm drain



FIGURE 61. On the east side, a concrete retaining wall with a cantilevered sidewalk defines the brook's edge in the Parkway section between Henderson bridge and Broadway.

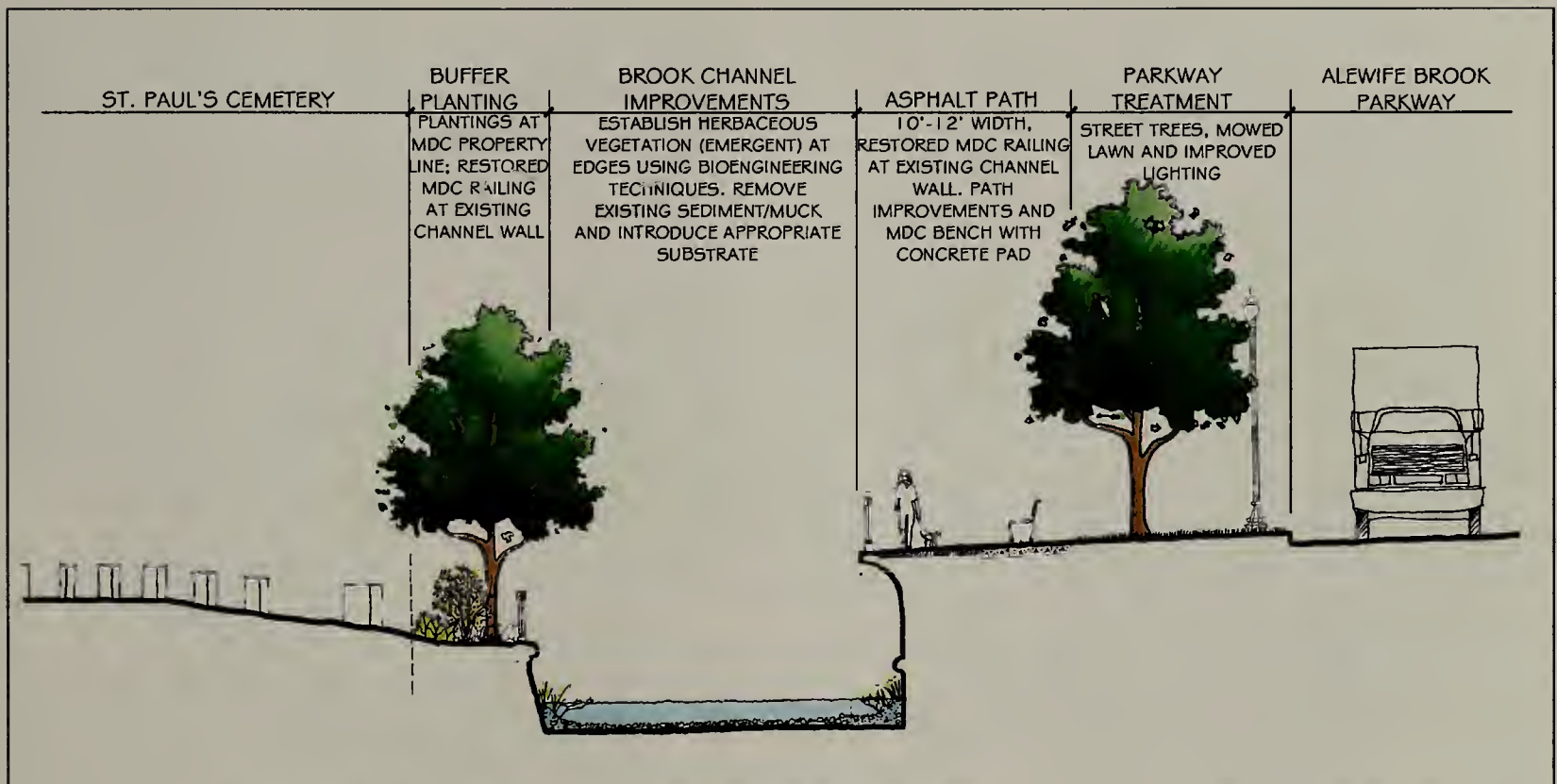


FIGURE 62. Proposed treatment at Alewife Brook Parkway and St. Paul's Cemetery

outfalls discharge to the brook along with three combined sewer outfalls. This is the narrowest portion of park land along the Parkway, with encroachments on either side. The narrow, tree-lined banks of the brook give way on the Arlington side to a small wooded area and cemetery and on the Cambridge side to an eroded paved sidewalk that overhangs the brook, with no trees to shade the water. Views of the open space of the cemetery from either the Henderson or Broadway Bridges are attractive. There are no historic resources of note.

Recommendations

1. Investigate the feasibility of replacing the concrete channel bed with a natural channel bed. A natural channel bed with variation in bed material size can improve the diversity of the benthic fauna and fish communities. Properly armored, a natural channel bed can prevent scour and destabilizing of the concrete channel walls as effectively as the current concrete channel bed. In addition, a natural channel bed can reduce peak summer temperatures and

improve dissolved oxygen levels. If it is not feasible to remove the concrete channel bed, then the unconsolidated sediment currently in place should be removed and replaced with appropriate natural bed materials like gravel and cobbles (long-term recommendation).

2. Install in-channel habitat structures to increase diversity, including herbaceous wetland vegetation. Herbaceous vegetation would also have positive effects on water quality.
3. Develop stands of riparian vegetation on the west side of the channel to provide shade during summer months and reduce peak water temperatures.
4. Construct an asphalt path on the east (Somerville) side of the brook. This reach is very narrow, therefore a path is proposed only on the east side, cantilevered over the brook. Supplemental tree plantings along the road and the installation of historic MDC lights will help to define the edge of the road and make passing through this confined section more pleasant.

5. Restore the historic railing on both sides of the brook and repair the concrete retaining wall where necessary.

AREA 8: ALEWIFE BROOK BETWEEN BROADWAY AND THE MYSTIC VALLEY PARKWAY

Existing Conditions and Key Challenges

This section of Alewife Brook is a natural channel composed of mostly unconsolidated muck. In a few locations stream bank erosion is occurring or appears imminent. In-stream habitat structure is formed by woody debris, and spawning herring have been observed near the confluence of the Alewife Brook and the Mystic River. Two dozen storm drains discharge into this section of the brook, which is fenced along its entire length.

Most of the western (Arlington) bank is covered by a dense stand of Japanese knotweed, alongside which a dirt path runs and into which some encroachments intrude. The eastern (Somerville) bank is also covered by knotweed, except in the Dilboy Field area where recreational infrastructure and a parking lot front onto the water, severing the dirt path in the process. A wide swath of parkland exists here. Several encroachments are located across the tree-lined Alewife Brook Parkway, along the east side of the Parkway in Somerville.

The confluence of the two waterways represents a major gateway to the Alewife Brook Greenway in that there are potential connections with recreational trails along the Mystic River Reservation. The Mystic River begins at the Lower Mystic Lake on the Arlington/Medford town border and runs southeastwards into Boston Harbor. Two sites of cultural importance are found here — the permanent overwintering campsite of Native Americans at the confluence, and the putative location of another Native village site across from Dilboy Field.



FIGURE 63. This open area on the west side of Alewife Brook will serve as a connection node between the Alewife Brook and the Mystic River Reservation.

Recommendations

1. Stabilize eroding stream banks with native vegetation and remove the fence along the brook. Vegetated banks will reduce the sedimentation of substrates and allow for variation in the channel bed, which in turn will support a more diverse benthic fauna and fish community.
2. Establish an invasive species removal program (see the maintenance recommendations and plan in Section 3F and Appendix D). Enhance the riparian buffer with tree and shrub plantings (see Appendix B). Planting of riparian vegetation will increase the diversity of habitat for birds and other fauna. In addition, shade from trees during the summer months will reduce peak water temperatures. Lower peak water temperatures can reduce algal growth and increase dissolved oxygen levels.
3. Establish a wildflower meadow south of the baseball field to increase diversity of habitats. Seed other open areas with fescue mix. (Refer to Appendix B for seed mixes.)
4. Retrofit parking lots at the MDC swimming pool and Dilboy stadium with best management practices and innovative stormwater management

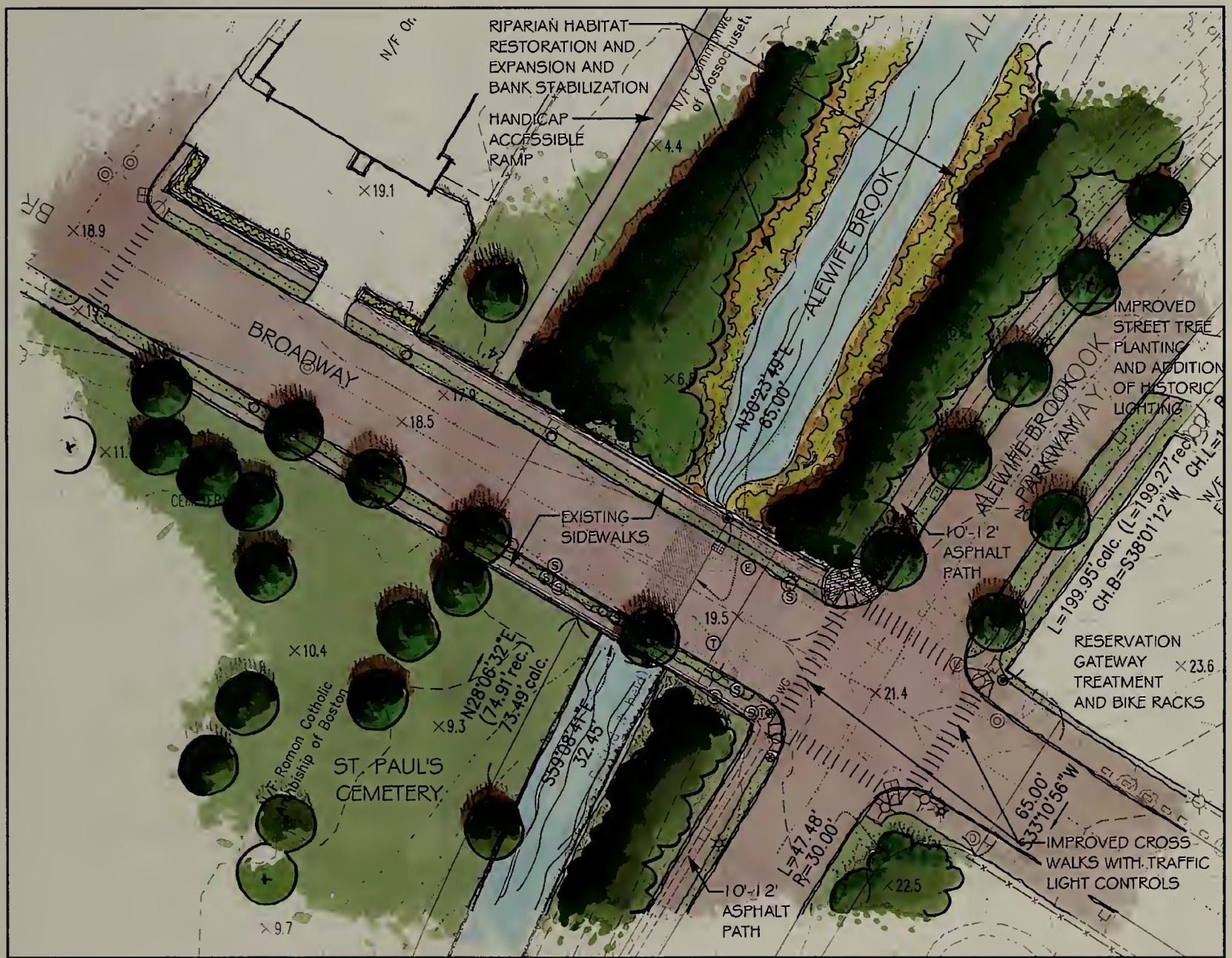


FIGURE 64. Proposed treatment for the Broadway-Alewife Brook Parkway intersection

techniques, for example, vegetated biofiltration swales to retain and treat runoff from asphalt surfaces before it enters the brook. Combine these treatments with educational features.

5. Install a stabilized aggregate path (8–10 feet wide) to run from Broadway north to the Mystic Valley Parkway on the west (Arlington) side of the Alewife Brook and to the tennis courts at Dilboy Field on the east side of the brook. Continue the path on the east side as a stabilized aggregate trail (4–6 feet wide), north to connections with the Mystic River trails.
6. Improve the Broadway–Alewife Brook Parkway intersection to serve as a gate-

way to the Alewife Brook corridor (see Figure 64). Incorporate directional signage and traffic light controlled crossings to provide for safe travel. Access to the Alewife Brook and Greenway is also possible via multiple neighborhood access points along the east and west sides.

7. Create a Gateway Park at the nexus of the Alewife Brook and the Mystic River to serve as a major gateway and connection point that will incorporate park amenities, interpretive and play features, paths, and stream access (see Figure 65). Historically used for Native American fishing camps, this area is well-suited for interpretation.



FIGURE 65. Proposed treatment for the Mystic-Alewife Gateway Park



FIGURE 66. The play area at the Gateway Park will feature a Native American longhouse, evoking the history of fishing camps at the confluence of the Alewife Brook and the Mystic River.



FIGURE 67. Conceptual representation of a gateway treatment that calls attention to key Alewife elements

8. Expand the existing playground north of Broadway to incorporate water play structures for children of all ages to experience water for both fun and learning. Install a viewing area with benches at the stream edge.
9. Provide boat access at the Dilboy parking lot. Install steps leading to the water's

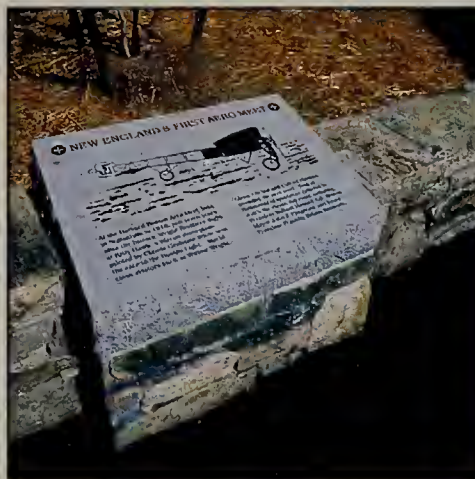


FIGURE 68. Interpretive signage can be incorporated into other site elements, such as stone walls.

edge for access. Remove invasive vegetation in this area.

10. Improve existing active recreational facilities at Dilboy Field, including stadium renovation, improvements to ball fields and pool, and incorporation of bathroom facilities.



IMPLEMENTATION

- A. Design Process and Priorities
- B. Schedule
- C. Budget
- D. Funding Sources
- E. Required Permits
- F. Encroachment Solutions
- G. Maintenance and Management
- H. Community Involvement and Stewardship

A. DESIGN PROCESS AND PRIORITIES

This Master Plan makes recommendations for the restoration of the Alewife Reservation and the Alewife Brook and its adjacent parkland. It will serve as a framework for the more detailed design stages currently underway. The conceptual ideas described herein will be modified and refined, as the design moves toward construction documents. Critical Reservation resources such as plant and animal habitat will be revisited to ensure that they are considered, enhanced, and protected in the final design. The MDC will provide citizens with opportunities to respond as these detailed plans take shape.

DESIGN PROCESS

1. *Master Plan Stage:* Visionary plan for the whole area and conceptual designs for selected sites are produced.
2. *Design Development Stage:* Design elements are refined for certain areas and developed to a higher level of specification. Preliminary cost estimates are produced.
3. *Construction Documents Stage:* Designs are worked out in detail using drawings, technical written specifications, and a detailed cost estimate allowing the recommended restoration designs to be built by a qualified contractor.

Metropolitan District Commission planners identified priorities for implementation within the project area at the outset of the Master Plan process. These areas include the Little Pond area, the former ADL parking lot, and the greenway along the west bank of Alewife Brook, and to ensure continuity, a segment on the east side between the Henderson Bridge and Broadway. However, the MDC is committed to implementing all the recommendations put forward in this document to the extent funding allows. Funding to bring the design for the greenway along the west bank to a more detailed level has been secured. The MDC is now seeking funding for 100% design and construction documents, specification preparation, and funds for the actual construction that will reclaim and rehabilitate this area, as well as additional funds for the design development stage for the other two priority areas. This will be a phased program requiring determination and continued support from the public, constituents, and elected officials.

In addition to design and implementation of the three MDC priorities, two other major projects in the Reservation area are moving forward. One is the design of a stormwater wetland in the Reservation south of the Little River. This project by the City of Cambridge and the Massachusetts Water Resource Authority in conjunction with the MDC is described in more detail in Section 4A. The work is being closely coordinated with the Master Plan team to ensure consistency with the goals and objectives defined in this Master Plan for the Alewife Reservation. The improvements this project will bring to the southern Reservation will be significant. If these improvements were not in process, this southern section of the Reservation would be among the MDC's top priority areas listed above.

The second project is the development of the Belmont Uplands adjacent to the Reservation



Figure 69: The greenway west of Alewife Brook is one of the three priority areas identified and will undergo detailed design in the next phase of planning.

by O'Neill Properties (see Section 4A for more detail). While there is significant opposition to the Belmont Uplands development by those concerned with the ecological impacts of this project, the developer has discussed some mitigation options with the MDC.

Although the MDC opposes the development of any remaining open space around Alewife, there are currently limited resources to purchase these private lands. Given this reality the MDC has worked with O'Neill Properties and the town of Belmont to provide as much protection and mitigation for the Reservation as possible. Among the numerous beneficial results will be a gift from O'Neill Properties to the MDC of a permanent Conservation Restriction for approximately 7.8 acres of upland and wetland habitat abutting the Reservation.

B. SCHEDULE

The time frame for implementation of the recommendations identified in this Master Plan depends on available funding for the necessary design and construction activities (refer to Section 3D for potential funding sources). The MDC anticipates a 10- to 20-year design and implementation process for this Master Plan. Full implementation for the three priority areas is expected to be possible within a 5-year

5-YEAR ACTION PLAN

Spring 2003- Spring 2004:

Design development and 100% construction documents for West Bank Greenway (area west of Alewife Brook)

Starting 2004:

Design development and construction documents for ADL parking lot and Little Pond

Starting 2004-2008:

Construction of restoration recommendations starting with West Bank Greenway, followed by ADL parking lot, and Little Pond in phases as funding becomes available

Starting Fall 2003:

Design development followed by construction documents for stormwater wetland south of Little River (by others with MDC coordination)

2004/2005:

Anticipated construction of stormwater wetland and associated recreational and educational features such as boardwalks and gathering area south of Little River in Alewife Reservation (by others with MDC coordination)

Starting 2005-2008:

Design for remaining areas in the Reservation, especially restoration of Wellington Brook and supplementation of boardwalk and path system as well as de-channelization of Alewife Brook between Route 2 and Henderson bridge, restoration of the cattail marsh, and restoration of the east side of the Parkway including redefining the Parkway edge with tree planting, historic lighting, etc.

period. Recommendations that require more extensive study and modeling regarding their feasibility, design development and construction (labeled as long-term recommendations in Section 2C) are not expected to be fully implemented within the 5-year time frame.

The development of the design for the identified priority areas will be the next step in the planning process and is expected to be completed by the summer of 2004. Partial funding is already secured for this phase of work.

A 5-year action plan follows, based on the assumption that funding can be secured and permits can be obtained in a timely manner. All those actions will either be executed by the MDC or implemented under close coordination with the MDC and with MDC's Master Planning team. Actions will be consistent with the goals and objectives put forth in this Master Plan.

C. BUDGET

Cost estimates will be prepared for implementing the conceptual designs and Master Plan recommendations. Recent restoration projects of similar size cost roughly one million dollars per mile of greenway. However, restoring a natural channel to the Alewife Brook will raise the cost of improvements along the Alewife Brook Corridor significantly. The MDC is eager to identify other agencies or businesses that share an interest in the restoration of the Alewife area. For example recent negotiations have been conducted by MDC Planning with the City of Cambridge and O'Neill Properties to fund design and construction of portions of proposed work within the Reservation and within the 7.8 acre Conservation Restriction to be gifted to the MDC by O'Neill Properties (see Section 4A for details).

D. FUNDING SOURCES

The phased implementation of this ambitious, ecologically oriented Master Plan will require ongoing support and adequate funding. Given the present fiscal climate, it is unlikely that restoration and enhancement of the Alewife Reservation and Alewife Brook corridor can be accomplished solely by support garnered from state funding of the MDC. There must be continued creative exploration by the MDC for alternative funding, new productive partnerships, and continued public support.

D1. PUBLIC SECTOR SOURCES

State and Federal Programs

Sources of potential state-level support include other state agencies that manage state parks, establish wetland mitigation banks, restore fish and game populations, do transportation planning or river management, or have environmental and public health concerns. The Commonwealth of Massachusetts passed a \$750 million bond bill in 2002 to support environmental capital projects such as these.

Federal funding opportunities include the US Department of Transportation (USDOT), the US Army Corps of Engineers (USACE), the US Environmental Protection Agency (USEPA), the Federal Emergency Management Agency (FEMA), the US Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS). Recommended ecological restoration projects (e.g., construction of a wetland on the site of the former ADL parking lot and dechannelization of Alewife Brook) will require significant funding. One viable funding source for such projects is the ecosystem restoration program administered by the USACE that is described in Section 206 of the Water Resource Development Act of



FIGURE 70. Biodiversity Days 2002. From right to left: Mayor Sullivan, Ellen Mass of FAR receiving \$2000 Riverways Inventory Grant check from former Secretary Bob Durand, Representative Alice Wolf, Representative Anne Paulsen, Representative Jim Marzilli

1996. This program provides funds for ecosystem restoration projects up to five million dollars, with a cost-sharing plan that asks the project sponsor to share 35% of the cost total. The USACE carries the remaining 65%. The USACE has shown interest in the past in the restoration of the ADL parking lot, Alewife Brook, and the cattail marsh and has included these sites among others in the proposed Massachusetts and Cape Cod Bay Ecosystem Restoration Feasibility Study.

Construction of past and recent MDC greenway restoration projects was mainly possible through funding from the federal TEA-21 program. The TEA-21 program derives from the Intermodal Surface Transportation Equity Act (ISTEA) authorizing funding of a wide variety of transportation infrastructure projects, including improvements to public greenways. The MDC plans to seek TEA-21 funding for the proposed greenway development on the west bank of the Alewife Brook. This will create a vital link in the regional path network and provide extensive ecological rehabilitation of the Alewife Brook corridor.

Public Agency Joint Ventures

Many of the local, state and federal agencies listed above should be approached to formalize working partnerships that are mutually beneficial to both the MDC and the respective public service mandate of the partnering agency. One such current initiative is the coordination and planning effort between the MDC, the City of Cambridge's Department of Public Works and the Metropolitan Water Resources Authority (MWRA) to create a stormwater wetland on a portion of the Reservation. The project will benefit wildlife and the park user, and will help alleviate serious pollution presently entering the Little River and Alewife Brook through combined sewer overflows (CSO).

Public Finance

Some of the most successful wetland and river corridor restoration projects in the country have obtained a large funding base through local voters approving a special bond to manage the specific project. Another approach being used elsewhere in the country involves establishment of a stormwater user fee through which residents and businesses are charged relative to the amount of runoff that leaves their properties. Adoption of such a program for the Alewife watershed could help sustain supplemental funding of options discussed above.

D2. PRIVATE SECTOR SOURCES

Private sector sources should be regarded more as supplemental funding sources since they are generally capable of generating limited resources compared to federal or state funds. Nevertheless they represent an important funding source, for example, for small-scale educational or interpretive projects.



FIGURE 71. A recent fundraising event in November 2002 for an environmental mural received broad support, from community members to state officials. From left to right: MDC Project Manager Dan Driscoll, Naturalist Peter Alden, Massachusetts Governor Mitt Romney.

Foundation and Individual Grants

Under federal and state tax laws, companies and individuals can receive tax benefits by donating some of their wealth to nonprofit charitable organizations (e.g., a community-based land trust). Creating such an entity for the Alewife area would be one way to raise funds for land acquisition, Reservation enhancements, and seasonal maintenance.

Special Events and Fundraisers

Many opportunities exist for creating public interest and financial support for ongoing restoration and enhancement efforts within the Alewife Reservation and Alewife Brook Greenway corridor. A recent event organized by the Friends of the Alewife Reservation (FAR), in which Massachusetts Environmental Secretary Robert Durand began the state-wide Biodiversity Days campaign from the banks of the Little River, brought helpful attention to the area. Similar opportunities exist for engaging government officials, the public, and businesses to raise visibility and support for the Alewife

Reservation and Brook. The highly successful Mystic River Run, in which joggers symbolically follow the spawning run of alewife upstream to the race finish line is another engaging, easily adaptable model for mobilizing public support through recreation and education.



FIGURE 72. The Alewife logo can be used on signs, clothing, brochures, and other items to help raise public awareness of and commitment to restoring the Alewife area.

Abutting Business Contributions

The Alewife Reservation and Alewife Brook are fringed by numerous abutters including apartment complexes, retail businesses, industries, and commercial office spaces. These institutions should be solicited to help sponsor restoration improvements along the particular section of the MDC lands to which they are adjacent. The strategy employed would be to establish an “adopt a wetland/greenway” program in which site improvements in the immediate area would be credited to the sponsoring group in a newsletter or some other form of public notification.

Neighborhood Business Contributions

Restoration of the Alewife Reservation and Alewife Brook Greenway will provide numerous economic benefits to the area. Green space has been shown to positively affect local communities by providing amenities that attract people to live and work in these communities. Proximity to open space increases property values. Opportunities for ecotourism and recreation generate economic benefits for area businesses, which create jobs and income for local

residents. Attempts should be made to engage those businesses that are situated within walking distance of the MDC lands. MDC and support groups should encourage good corporate citizenship through supporting the overall neighborhood improvements that will ensue through implementation of the Master Plan.

Merchandise Sales

Revenue might also be generated by community groups through the sale of products such as clothing sporting the Alewife logo, field guides to the flora and fauna of the Alewife area, and maps of trails and other points of interest for pedestrians and cyclists.

E. REQUIRED PERMITS

Permits are required whenever proposed work may affect environmentally sensitive areas such as water bodies, wetlands, floodplains, rare or endangered species habitat, historic and archeological sites, and sites with hazardous materials. Some federal, state and local agencies will need to review and/or permit components of the Master Plan prior to construction. Plan implementation may fall under the jurisdiction of the following policies and regulations.

Clean Water Act, Section 404 and Rivers and Harbors Act of 1899, Section 10. (33 USC 401-426; 40 CFR 230). This act controls discharges of dredged or fill material in wetlands and water bodies in order to restore and maintain the chemical, physical and biological integrity of US waters (federally defined wetlands and water bodies). Section 10 of the Rivers and Harbors Act requires coordination with and approval by USACE for dredging in US waters and/or construction of structures in US waters.

Clean Water Act, Section 402 and the National Pollution Discharge Elimination System (NPDES). (33 USC 1342; 40 CFR 122-125, 131, 14 CMR 3.00.) This act sets standards for point and nonpoint discharges of wastewater into surface

water bodies and sets ambient water quality criteria that must be met. It also sets forth a process by the US Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MADEP) for granting General Permits, Group Permits and Individual Permits. In Massachusetts, the USEPA issues permits and the MADEP certifies permit conditions.

Massachusetts Environmental Policy Act. (30 MGL 61; 301CMR 11.00.) This policy is the state equivalent of the National Environmental Policy Act. It sets forth a process of environmental impact analysis and public review of state projects. It is applicable to projects directly undertaken by state agencies; private projects seeking permits, funds or lands from the state; and any projects that will dredge, fill or alter more than 1 acre of wetland. (It does not apply to private projects requiring local approval only.) Review is based upon an Environmental Notification Form and/or Environmental Impact Report. Upon approval by the MA Office of Environmental Policy Act, the project is issued a Certificate.

Massachusetts Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Material Disposal in Waters of the US within the Commonwealth. (21 MGL 26-53; 314 CMR 9.00.) These regulations outline procedures for the Massachusetts administration of the Clean Water Act Section 401 for discharges in US waters within Massachusetts. Discharge is not permitted if there is a practicable alternative with less adverse impact on aquatic ecosystems. Potential adverse impacts to wetlands and land under water must be minimized and mitigated. Activities must comply with State Surface Water Quality Standards. A Water Quality Certification is required when a federal permit (Clean Water Act 404/Section 10) is needed for filling wetlands or waterways.

Projects with impacts to areas less than 5,000 square feet are reviewed and approved by the local Conservation Commission. Projects with impacts on areas more than 5,000 square feet are reviewed by the MADEP Division of Water Quality Control and are issued a Major Water Quality Certification.

Massachusetts Public Waterfront Act and the Waterways Licenses Law. (91 MGL 1.00 et seq.; 310 CMR 9.00.) This act defines private property rights in tidal areas to mean low water. It defines public access rights to tidal land between mean low and mean high water for the purposes of fishing, fowling and navigation. Public access rights extend to mean high water in tidal bodies and ordinary high water in non-tidal bodies. Access rights are also extended to “filled tidelands,” i.e., to the historic high water in areas filled as long ago as the 1640s. Proposed activities that will occur below mean high water in flowed or filled tidelands requires a Waterways License from the MADEP Division of Waterways.

Massachusetts Wetlands Protection Act. (131 MGL 40; 310 CMR 10.) This act prohibits damage to inland wetland, river, and coastal resource areas within 100- foot buffer zones (25 feet in designated urban areas). No resource areas may be altered, filled, dredged, or removed in such a way as to adversely impact water supplies, groundwater sources, surface water quality, flood prevention, shellfish habitat, fisheries, and wildlife habitat. It also sets forth the MA Stormwater Management Policy and its performance standards. The jurisdictional riverfront resource area of the Little River in Belmont and Arlington is 200 feet wide; however, the riverfront area of Alewife Brook and Little River in Cambridge and Alewife Brook in Somerville is only 25 feet wide. Proposed projects with impacts less than 5,000 square feet are reviewed and permitted by municipal Con-

servation Commissions. The MA Department of Environmental Protection reviews projects with greater impacts.

Municipal Conservation Ordinances. Belmont, Cambridge, and Somerville do not have ordinances. The Town of Arlington has Wetlands Protection Town Bylaws that regulate wetlands in more detail than the Massachusetts Wetland Protection Act.

Massachusetts Endangered Species Act. (131A MGL; 321 CMR 10.00.) This act prohibits the taking of state-listed rare and endangered species and damage to their habitat. The Massachusetts Natural Heritage and Endangered Species Program will review proposed activities to determine whether any priority habitats or state-listed species occur in the project area and will recommend how to minimize any potential impacts.

Historic and Archaeological Preservation. The Massachusetts Historical Commission may need to review proposed activities to determine if they have potential impacts on historic or archaeological resources.

F. ENCROACHMENT RESOLUTION

Key steps toward implementing the Master Plan involve reclaiming properties from unauthorized commercial, industrial, and residential abutters that have illegally extended their property onto MDC parkland. Such encroachments include gardens, storage of materials, vehicle parking lots, fences to and along the water's edge, and portions of buildings.

Using the process outlined below the MDC Planning Office resolved approximately 75 encroachments along the Charles River, above Watertown Square. Several of these former "encroachers" are now stewards helping to maintain the new greenway along the Charles River.

The framework for resolving encroachment issues includes surveying property lines to determine ownership and to identify possible violations. With this information, abutting property owners must be notified and opportunities created for amicable resolution. As part of the Master Plan a new survey was developed by Judith Nitsch Engineering based on aerial photography taken in the spring of 2002. This survey information will be used by the MDC in resolving existing encroachments.

The MDC developed a detailed guide for encroachment resolution from their experience

ENCROACHMENT RESOLUTION PROCESS

1. Create a list of owners and occupants.
2. Notify tenants of an upcoming survey.
3. Conduct a survey to delineate property lines and set boundaries in the field.
4. Photograph the site and film video documentary.
5. Check all past leases.
6. Decide long-term restoration strategy and restoration plan.
7. Hold meetings with encroachers.
8. Develop an encroachment compensation formula.
9. Calculate the size of all encroachments.
10. Establish an Encroachment Reclamation Trust Fund.
11. Send abutter notification letters.
12. Distribute Acknowledgement of State Ownership/Agreement to Quit Forms.
13. Distribute Memorandum of Agreement.
14. Return signed Acknowledgments and MOAs to abutters.
15. Continue abutter communication.

along the Charles River Reservation. The process will be used for resolving encroachments and reclaiming public land along the Alewife Reservation and Alewife Brook corridor.

G. MAINTENANCE AND MANAGEMENT

Restoration of the Alewife Reservation and Alewife Brook Greenway is a long-term investment that requires a comprehensive maintenance and management program. The success of the Master Plan depends on a commitment to execute maintenance and management plans after construction is completed. The MDC acknowledges citizen criticism voiced about inadequate maintenance and management in the past and is dedicated to improving the current effort. However, increased maintenance will result in increased costs that in the past MDC was not able to bear due to budget constraints. It is therefore unlikely that adequate and effective maintenance can be performed solely by the MDC. Hence this Master Plan recommends that the MDC take advantage of the growing public interest in natural areas and create mechanisms for citizens to participate in the ongoing care and maintenance of the Alewife area (refer to Section 3H for proposed strategies).

G1. MAINTENANCE

The following maintenance recommendations (described in detail in Appendix D) are designed to ensure the long-term ecological health and integrity of the Alewife system. Conventional maintenance strategies typically used for urban parklands are unlikely to meet the needs of a complex ecological system like the Alewife area.

In general, maintenance strategies should reflect a commitment to environmentally sensitive methods. Such methods typically favor physical labor over chemical applications; the

KEY MAINTENANCE STRATEGIES

- Establish a schedule of routine activities (weekly, monthly, seasonally, annually) to tend the landscape and perform minor repairs. Routine activities include clean up of litter and trash, seasonal removal of debris, and maintenance of storm drainage structures. Inspection and repair of paths, walkways, and site furnishings should also be carried out.
- Establish a program for invasive species control in both the Alewife Reservation and Alewife Brook Greenway. The full range of invasive species should be monitored and managed, including aquatic, herbaceous, and woody types. Long-term monitoring is critical, because once an invasive species enters the landscape, eradication becomes very difficult.
- Provide turf and plant maintenance for the Alewife Brook Parkway, including regular weeding, pest and disease control, watering, fertilizing, mulching, pruning, replanting, seeding and mowing. Meadow areas in the Reservation will also require mowing once or twice a year, as well as possible overseeding during the first three years to combat weeds and invasives.
- Develop a schedule and budget for the replacement of infrastructure, site amenities, and plantings as they wear out or decline with age.

use of low-toxicity, low-residue compounds; and strategies such as Integrated Pest Management (discussed in Appendix D).

The Alewife Reservation and Alewife Brook corridor share some maintenance require-

ments, however, they also have significant differences. The Reservation should ultimately develop into a self-sustaining, natural system that requires limited intervention (e.g., servicing of infrastructure elements such as paths and boardwalks). The Alewife Brook corridor is a more controlled area that will require more frequent intervention.

G2. MANAGEMENT

It is essential that the entire Alewife system, from Little Pond to the confluence with the Mystic River, be managed as a single entity to ensure uniformity of the vision and programming of the management decisions. Fortunately the entire site is under the MDC's jurisdiction. Consideration should be given to hiring an Alewife MDC ranger to be responsible for oversight of the entire parkland. The six key components that have frequently been identified as being essential to open space management programs include consideration of user safety and risks, patrol and emergency procedures, administration, programming and events, stewardship and enhancement, and funding for ongoing activities.

H. COMMUNITY INVOLVEMENT AND STEWARDSHIP

Planning is a vital component of open space management. This Master Plan is a critical step toward proper stewardship. Often the plans that work best are those supported by organizations, corporations, institutions, and a mobilized community of concerned individuals, which this one is. Public-private partnerships can provide the best opportunities to ensure implementation success by combining community spirit, entrepreneurial drive, volunteerism, good corporate citizenship, financial resources, professional expertise, and long-term commitment. It is also important to cultivate a sense of community pride, support, and shared stew-

ardship. All of those factors are required to properly restore the Alewife Reservation and Alewife Brook corridor.

H1. VOLUNTEER EFFORTS

Restoration

Sustainable, and therefore successful, environmental restoration projects involve more than simply repairing degraded physical landscapes. Restoring the degraded human-nature relationship is equally important. Efforts should be made to engage the local community to help restore the Alewife Reservation and Alewife Brook corridor rather than relying solely upon professional practitioners. The successful removal of water chestnut from the Alewife area water bodies is an example of excellent MDC-volunteer coordination and partnering. Well-managed and organized public involvement in restoration projects can help ensure ongoing maintenance and support for the area. All such efforts must receive the guidance and approval of the MDC.

Stewardship

Public involvement is critical to a successful planning effort. A lack of public involvement and caring generates "orphan" open spaces and parklands. The continued involvement of concerned individuals for periodic trash clean-ups and removal of invasive plants will be essential to achieving the Master Plan recommendations and sustaining a long-term stewardship program for the Alewife Reservation and Brook.

H2. ORGANIZATIONS

Education

The creation of interpretative programs at Alewife for school children and adults will help generate the needed commitment to restore and enhance the Alewife Reservation and



FIGURE 73. Teenagers displaying good stewardship of the Alewife Reservation by performing a trash clean-up.

Alewife Brook corridor. Educational materials could include brochures, newsletters, videos, models, and school curricula. After-school programs and guided tours will provide on-site education.

Coalition Building

There are currently more than a dozen citizen groups with interest in the long-term well being of the Alewife Reservation and Alewife Brook corridor. These groups are focused on flooding, water quality, municipal projects to separate storm and sanitary sewer drains, cleaning up the Alewife Reservation, educational opportunities for local schoolchildren, and influencing proposed developments and re-developments in the area. These include, in alphabetical order:

- Alewife Neighbors
- Alewife Study Group
- Belmont Citizens' Forum
- Boston Society of Architects
- Cambridge Highlands Neighborhood Association
- Coalition for Alewife
- Concord-Alewife Study Group

- East Arlington Good Neighbor Association
- Friends of Alewife Reservation (FAR)
- Friends of Blair Pond
- Friends of the Community Path
- Friends of Fresh Pond
- Massachusetts Bicycle Coalition
- Mystic River Watershed Association
- North Cambridge Stabilization Committee

Merging some of these groups could provide a centralized, more effective, and better funded advocacy organization.

Faculty and students from Tufts University, the Graduate School of Design at Harvard, and Antioch New England Graduate School have been involved in study and research in the area. At Master Plan public meetings the MDC and team members emphasized the need for cooperation among these citizen groups. In addition, the importance of working with municipal departments and state agencies was highlighted. All of these stakeholders have expressed strong interest in holding forums to facilitate cooperation and a unified call for attention and resources for addressing Alewife's watershed challenges.

Summary Recommendations:

- Create an efficient agency mechanism for coordination of volunteer efforts (e.g., hire a full-time park ranger)
- Establish a regional forum or roundtable that brings all involved citizen groups, institutions, and numerous municipal departments and state agencies together to discuss and coordinate efforts



4

RELATED PROJECTS AND RECOMMENDATIONS

A. Projects Related to Study Area

B. Recommendations Beyond Study Area

A. PROJECTS RELATED TO STUDY AREA

A number of projects related to the Master Plan study area are planned or underway by the MDC, abutting towns and cities, neighboring property owners and developers. The status of these projects varies. Some are very advanced in their design and/or construction, others exist only in concept. Development within the Alewife subwatershed had and will continue to have an effect on the hydrologic regime of the receiving water bodies and groundwater in the Alewife Reservation and Alewife Brook corridor (see Section 2D). Descriptions of the various projects follow.

A1. MDC FLOODPLAIN MAPPING PROJECT

For the past 20 years development activities have proceeded in the watershed without updates of the 1982 floodplain lines delineated by the Federal Emergency Management Agency (FEMA). The MDC has identified the need to verify those lines throughout the Alewife area 100- and 200-year floodplain. The MDC hired Applied Geographics to produce updated and corrected floodplain maps for all floodplains around the Alewife Reservation, Alewife Brook, the Mystic River, Fresh Pond, and Spy Pond. These new maps should advance understanding as to why so many properties “outside” the 1982 delineated floodplain regularly have flooding problems. This is one helpful step of many that are needed to thoroughly understand the complex flooding issues in this watershed. The work under this contract is expected to be completed by the end of 2003.



FIGURE 74. The MDC floodplain mapping project will review and adjust the existing FEMA 100-year floodplain lines for the Alewife Reservation, Alewife Brook, the Mystic River, Fresh Pond, and Spy Pond. New orthophotos allow for much greater accuracy.

A2. MDC MYSTIC RIVER HYDROLOGIC AND HYDRAULIC STUDY

The MDC has contracted Camp, Dresser and McKee (CDM) for a study and conceptual design for the new Upper Mystic Lake Dam. This project includes a hydrologic and hydraulic (H&H) study of the Mystic River Watershed (Phase I) and the development of required dam safety improvements recommendations as well as the conceptual design of a fish ladder at the Upper Mystic Lake Dam (Phase II). The objectives of the study are to identify constrictions that prevent flood flows from reaching the Amelia Earhart Dam and pumping station and to establish the role of the Upper Mystic Lake Dam in flooding within the basin. Extensive hydrologic and hydraulic modeling has been conducted and findings were presented to the public in April 2003. The major conclusions presented are:

- Flood obstructions have been removed. No other identifiable constrictions on either the Mystic River or Alewife Brook exist.
- No localized constrictions exist that are

cost-effective to eliminate

- Not practical to reconstruct Alewife Brook and Mystic River channels or tunnel flow to alleviate problem
- Upper Mystic Dam safety improvements can be made without adversely affecting downstream flooding levels
- Flood monitoring program is recommended to collect better data for future projects.

Any applicable findings of this study will be incorporated into the design development of the Alewife Reservation and Alewife Brook Greenway restoration.

A3. CAMBRIDGE STORMWATER WETLAND

South of the Little River in the Alewife Reservation, the Cambridge Department of Public Works and the Massachusetts Water Resource Authority (MWRA) have proposed a stormwater wetland as part of the Long-Term CSO Control Plan for Alewife Brook. A primary function of the wetland is to receive and treat the stormwater that will be separated from the sewage that flows through Cambridge sewer pipe CAM004, thus preventing the combined sewer overflows from continuing the pollution of the Little River and Alewife Brook. The

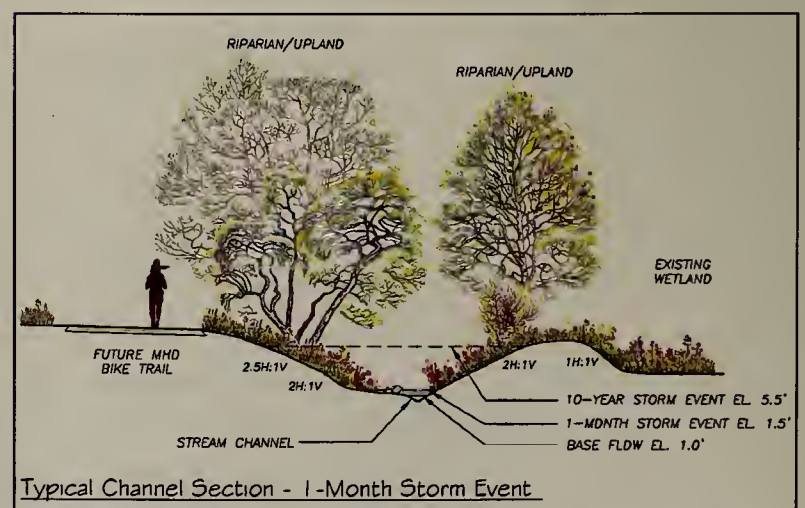


FIGURE 75. A restored natural stream channel is designed to convey stormwater to the wetland for water quality treatment and will provide habitat for wildlife.

separation project and the use of natural processes in the wetland to remove contaminants will significantly improve the quality of the stormwater that flows into these waterways.

The stormwater wetland is designed, also, to meet the goals and objectives of the Master Plan for Alewife Reservation with respect to wildlife habitat enhancement, hydrological improvements, and recreational and educational opportunities. For example, the smaller wetland cell designed for compensatory flood

storage will feature a large open water area connected to the Little River to allow alewife, blueback herring, and other fish to enter this protected area for reproduction.

The projected benefits of this new wetland are described on page 64.

A4. BELMONT UPLANDS DEVELOPMENT

The 15.6-acre Belmont Uplands site, located northeast of Little Pond, is the highest elevation in the area. Although not part of the MDC Alewife Reservation, it is contiguous to it and supports a mature silver maple forest, a habitat type not found in the Reservation. This forested area is home to many animals, including large mammals like deer and coyote. Coyote apparently use the area for daytime cover before going downstream to hunt at night. The area also likely supports vernal pools that provide breeding grounds for amphibians in the spring.

Benefits for Alewife Reservation from the Stormwater Wetland Project:

- Improved water quality through elimination of combined sewer overflows into the Cambridge sewer outfall CAM004 and additional water quality treatment of the remaining stormwater through a natural wetland system
- Enhanced habitat diversity through the creation of low marsh, high marsh, and upland plant communities
- Expected enhanced hydrologic conditions in the surrounding wetlands through increased resident time of stormwater in wetlands, with concomitant increased infiltration and a seasonally elevated watertable
- Recreational and educational opportunities to study wildlife and plants from boardwalks, paths, and overlook platforms incorporating signage and a public gathering space
- Connection to main gateway to the Reservation and MHD Bike Path
- Invasive species control and restoration of native plant communities
- Long-term maintenance and monitoring by the Cambridge Department of Public Works



FIGURE 76. Foot trails lead through the silver maple forest.

The parcel is owned by AP Cambridge Partners II, LLC and O'Neill Properties Group. In 2002 the Town of Belmont approved a zoning bylaw that allows for the commercial development of this site. The current plans propose a commercial building and structural parking on approximately 7.8 acres. The MDC Planning Office and the Town of Belmont have negotiated a Conservation Restriction (CR) to preserve and enhance the remaining 7.8 acres of upland and wetland habitats. The O'Neill Properties Group has agreed to gift this CR to the MDC. In addition they will provide habitat enhancement, forest management that enhances biodiversity, long-term maintenance of the CR area, and a public trail that connects to the MDC Alewife Reservation trail network. (Refer to the Master Plan fold-out map in Appendix E for areas recommended for Conservation Restriction).

The development of the Belmont Uplands site will have negative effects on the habitat value of the whole Reservation given the loss of forested land and decreased habitat connectivity. However, the MDC has worked closely with the developer to define measures that protect and enhance the remaining open space and its connection to the Alewife Reservation. (See Open Space Maintenance Plan, Belmont Upland Site, by Epsilon Associates, revised May 2002 for further details.)

A5. ACORN OFFICE PARK REDEVELOPMENT

In 2001 the Bulfinch Companies and the McKinnon Company, the owners of the Acorn Office Park (formerly Arthur D. Little headquarters), developed a master plan that outlines the redevelopment of this office building complex. Currently Bulfinch Companies uses MDC land, the former ADL parking lot, to satisfy the company's parking needs. The MDC issued Bulfinch a permit for the use of the existing lot. Proceeds from that permit have helped fund a large amount of this Master Plan. The MDC plans to reclaim this land within the next

five years and restore the area as described in Section 2C, Area 2 of this Master Plan.

The office complex currently expands south of Acorn Park Drive up to the Little River and divides the Reservation land north of the river. The redevelopment plan calls for restructuring of the building complex in three phases, which would ultimately result in the demolition of all building and structures south of Acorn Park Drive. The MDC and the property owners are discussing the reclamation of this area as open space through a Conservation Restriction (similar to the agreement for the Belmont Uplands). This plan could potentially benefit the Alewife Reservation through restored floodplain, improved habitat connectivity, and increased flood storage capacity. (Refer to the Master Plan fold-out map in Appendix E for areas recommended for Conservation Restriction.)

A6. ARLINGTON HOTEL

Completed in 2002, this new hotel complex in the Town of Arlington is located off Massachusetts Avenue adjacent to the Alewife Brook Greenway. Because the hotel development required the temporary use of the abutting Parkway, an agreement between the hotel developers and the MDC Planning Office was reached requiring mitigation for the temporary



FIGURE 77. The Arlington Hotel is set right on the border of Alewife Brook Parkway. This picture shows a view into the Alewife Brook corridor approaching from Massachusetts Avenue.

disturbance of the public open space. Mitigation measures included revegetation of the Alewife Brook corridor with native tree and shrub species, which were planted in the fall of 2002. In addition, the hotel owner agreed to take over the maintenance of a defined section of the Alewife Brook corridor adjacent to the hotel and has committed to removing invasive species in this area.

A7. FITCHBURG CUTOFF BICYCLE TRAIL

The Massachusetts Highway Department (MHD) plans to upgrade the existing stone dust trail (also known as the Fitchburg Cutoff Trail) at the southern border of the Reservation. The improved trail will be a 12-foot-wide, two-way, multi-use asphalt path, including a vehicular bridge (for maintenance purposes) over Old Alewife Brook behind the Alewife subway station. This proposed path improvement project would strengthen a vital link in the regional path system and is also an important component of the Master Plan trail system. Construction of the project has been on hold for several years, although funding is in place. According to 2002 survey information, the existing trail is located partially on MHD land and partially on MDC land. Thus coordination among the MHD, MDC, and City of Cambridge (which will use portions of the path for stormwater wetland maintenance) is recommended to bring this project to fruition.



FIGURE 78. The existing, narrow stone dust path parallel to Boston-Maine Railroad tracks

B. RECOMMENDATIONS BEYOND STUDY AREA

The Alewife Reservation and Alewife Brook corridor comprise less than 4% of the total Alewife watershed, thus successful management of this site cannot occur in isolation from the surrounding cityscape. In particular, plans to develop abutting properties (e.g., the Belmont Uplands, the former skating-rink site, Acorn Office Park, Cambridgepark Drive, and the Mugar and Martignetti sites) and more distant, but still ecologically linked sites (e.g., Alewife Industrial Quadrangle area) must be carefully considered in light of their potential impacts to the Alewife Reservation and the Alewife Brook corridor.

Using the framework of recommendations established by this Master Plan, a review of proposed development plans for the surrounding areas is highly advisable. Promising elements from other existing studies and plans can be extracted. These urban planning initiatives should be oriented toward sustaining and protecting the investments of the Alewife Reservation and Greenway.

B1. WATERSHED PLANNING

It is essential to place site-specific restorative designs in both a larger landscape and a larger management context, in this case where the two are in the same watershed. From an environmental perspective, watersheds are the most appropriate units in which to manage water resources effectively in the urban landscape. Even if all the recommendations of the Master Plan are implemented, it is unlikely that the Alewife Reservation and Alewife Brook will be able to sustain long-term ecological health without additional positive changes in the watershed. An effective, comprehensive watershed management plan must be developed that will prevent, or at least reduce, the severity of the problems that necessitated the need for the

restoration effort in the first place.

The following elements should be addressed in developing a plan for the larger Alewife watershed:

Land Use Planning

- Development of a model of the watershed that identifies pervious and impervious areas
- Examination of land use management techniques and alternative future development scenarios for the entire watershed

Land Conservation

- Identification and prioritization for protection of all sites targeted for development (e.g., Belmont Uplands) to preserve important watershed hydrologic functions
- Prioritization for protection and possible acquisition by MDC of all undeveloped lands adjacent to the Reservation (e.g., Belmont Uplands, Mugar parcel, Martignetti property, portions of Acorn Office Park, Jerry's Pond, northern piece of the cattail marsh) because these sites provide key wetland and upland habitat and flood storage capacity, all of which could be enhanced following acquisition

Aquatic Buffers

- Examination of potential protective buffer strip creation and planting schemes for headwater streams and ponds

Hydrological Connections

- Improvement and maintenance of existing hydrological connections between flood storage areas and identification of additional areas suitable for this

use (e.g., former MDC skating rink site, Martignetti property, Mugar parcel, Thorndike playing fields)

- Investigation of opportunities for “daylighting” or opening up now buried streams in the Alewife watershed (e.g., Alewife Brook, Upper Wellington Brook, Winn's Brook)
- Better, ecologically sustainable site and building design
- Implementation of stormwater Best Management Practices (BMPs)
- Development of guidance directives for reducing stormwater runoff by encouraging a “start at the source” BMP effort by individual homeowners
- Assessment of the potential for retrofitting low impact development stormwater BMPs such as “green parking lots” into the existing urban framework
- Discourage developers from using underground stormwater detention basins as a means to achieve a no-net discharge of runoff from their sites because these

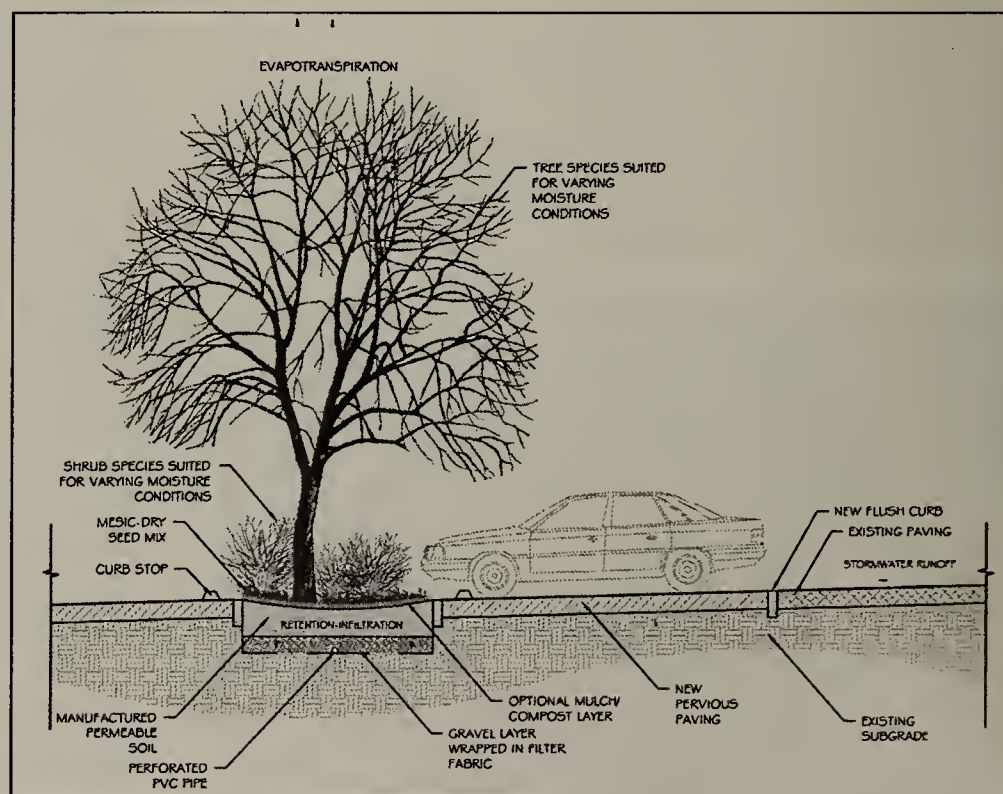


FIGURE 79. Stormwater bioretention basins as proposed for the Dilboy Field parking areas could be implemented throughout the watershed.

systems are inadequate for sustaining wildlife

- Update FEMA floodplain delineation

Erosion and Sediment Control

- Development of guidance directives for reducing erosion from abutting properties
- Assessment of the potential for retrofitting erosion control BMPs into the existing urban framework

Non-Stormwater Discharges

- Investigation of structural and non-structural controls for limiting lawn and wastewater discharges and for uncoupling illicit connections, with an accompanying management plan and detailed implementation strategy and budget

Watershed Stewardship Programs

- Outline program for public and private stewardship that helps sustain the watershed

B2. LANDSCAPE ECOLOGY PLANNING

One measure of the ecological health of a landscape is the overall connectivity of the natural open spaces that are present. A fragmented landscape is generally inhospitable for wildlife, yet a network of green corridors connecting “island” habitat patches can significantly improve habitat value. Maintaining large, intact parcels is even more beneficial as certain species require interior habitats far from any edges.

Unfortunately, land use planning often occurs at the scale of individual development sites, with little understanding about the implications of those projects upon the larger ecological context of the landscape or region. Land use planning must shift from its reactive mode — merely responding to existing environmental constraints — to a more proactive mode, whereby green open spaces are prioritized

first and human developments fitted into, not against, the ecological landscape. The Alewife Reservation and Greenway are urban wilds within a sea of suburban sprawl and generally unrestrained development. The long-term viability of healthy populations of terrestrial animals located within the Reservation and Alewife Brook corridor needs to be considered when undertaking planning efforts. Emphasis should be put on maintaining a resident population of a sufficient size to ensure genetic diversity and facilitating the genetic exchange with other distant populations.

The following elements should be addressed in developing a landscape ecology plan for the Alewife area:

Habitat Patches

- Prioritization for protection and possible acquisition of all undeveloped and vacant lands adjacent to the Reservation (e.g., Mugar and Martignetti properties, sections of Acorn Park) and the Greenway (e.g., W.R. Grace property) as potential sites to increase the size of the contiguous wildlife habitat
- Identification and characterization (e.g., overall size and ability to sustain populations, ratio of interior to edge dimensions, habitat diversity and edge structure, resilience to disturbance, and recolonization potential) of isolated habitat patches proximal to the Reservation and Greenway
- Prioritization for protection of those patches deemed most beneficial for augmenting and sustaining wildlife within the MDC managed lands

Corridors and Connectivity

- Identification and characterization (e.g., corridor width and length dimensions, gap isolation between patches, “stepping stone” connectivity of patches)

of those areas that can be connected to the Alewife Reservation and Greenway through creation of wildlife corridors

- Prioritization for protection of those locations deemed most suitable for creating wildlife corridors to the MDC managed lands (e.g., the existing corridor provided by the Mystic River to the Mystic Lakes, the potential corridor along the Mystic River to Boston Harbor, the potential corridor through the future developed Alewife Industrial Quadrangle that will link the Alewife Reservation via Blair Pond and Rafterty Park to the Fresh Pond Reservation, and the potential corridor from Little Pond to Spy Pond beneath Route 2)
- Investigation of stream daylighting opportunities in the Alewife watershed (e.g., Alewife Brook, Upper Wellington Brook) and incorporation in regional

planning concepts to create open stream corridors.

- Improve fish passage at the Amelia Earhart Dam at Boston Harbor by managing the dam operation to allow for fish to pass during the spawning season or by installing a fish ladder that allows for passage at all times.

B3. REGIONAL TRAIL NETWORK AND ENVIRONMENTAL EDUCATION PLANNING

Outdoor recreation has become as popular within cities as it has always been in the countryside. One outcome resulting from this urban increase in recreational activity is the accelerated construction of regional trail networks. In terms of public circulation and pedestrian and cycling use, connecting the newly designed trail systems within the Alewife Reservation and Alewife Brook Greenway to the larger network of trails throughout the

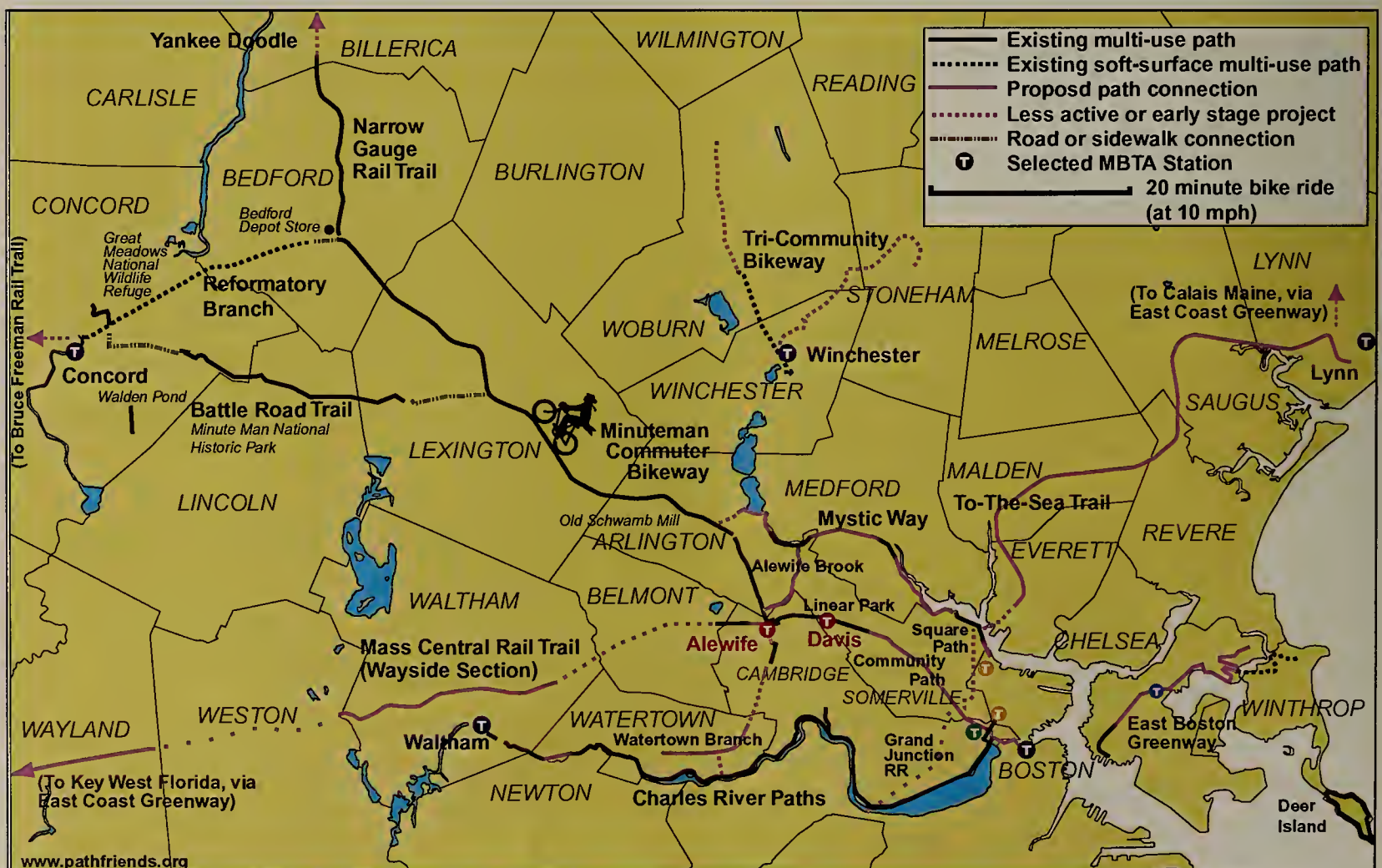


FIGURE 80. Evolving Multiuse Path Network, Boston North (map by Bryce Nesbitt).

surrounding region is essential. Opportunities for such connections exist with the Minuteman Path (which runs from the Alewife subway station, past the Reservation and northwest to Lexington), the Mystic River Greenway (from the confluence of the Alewife Brook north to the Mystic Lakes and south to the Amelia Earhart Dam), and the Fitchburg Cutoff Bicycle Trail (a section of the Mass Central Rail Trail which will run east from the Alewife subway station into Belmont and will connect east to the Linear Path and Danehy Park).

In addition, potential exists for establishing new trails that would link with the Alewife Reservation and Greenway. One such possibility would be a trail alongside a newly daylighted Alewife Brook creating a new greenway link from the Alewife subway station south to the Fresh Pond Reservation.

Transportation has always been a serious and recurring planning problem facing the Alewife area. Although the acrimony of the debates of several decades ago in relation to the widening of Route 2 have subsided, questions about how best to manage automobiles moving through this area are very much at the forefront of present-day planning concerns. Such heated discussions include, but are not limited to:

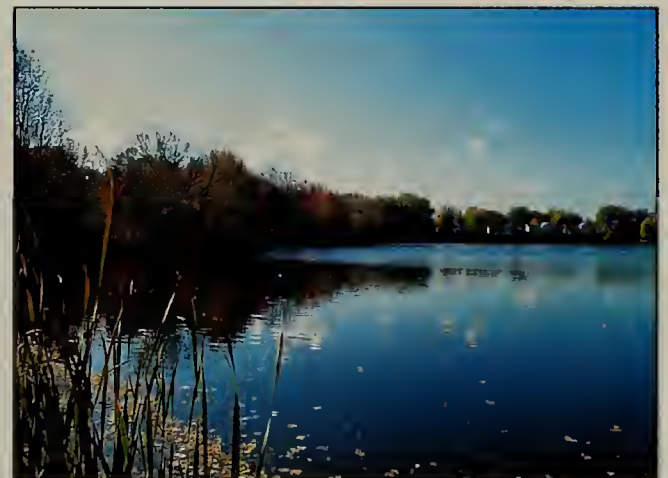
- how the proposed future development slated for the Belmont Uplands will affect vehicular flow along Lake Street and access off Route 2
- whether the Mugar site in Arlington will receive permission to build an off-ramp from Route 2
- the poorly designed intersection from Route 2 to the Alewife Brook Parkway formerly known as the Dewy traffic circle

- the number of lanes of the Alewife Brook Parkway and its merging with the Mystic River Parkway
- proposals to create a crossing from Cambridgepark Drive into the Alewife Industrial Quadrangle area

The mandate of this Master Plan is to focus on the parklands of the MDC. The planning team recognizes, however, that the successful restoration and maintenance of the Alewife Reservation and the Alewife Brook corridor (particularly the latter) should be considered in the context of a new regional traffic management plan.

Another effort that is linked to traffic planning in the Boston metropolitan area is the Historic Parkways Initiative launched in 2002 by the Executive Office of Environmental Affairs. The initiative's slogan "A Parkway is not a road. It's a park with a road in it." stresses the importance of parkways as valuable historic open spaces and not solely as transportation corridors that they are often reduced to. It was developed through an interagency effort including Metropolitan District Commission, the Department of Environmental Management's Historic Landscape Preservation Program, the Massachusetts Highway Department, and the Massachusetts Historical Commission. The project's goal is to protect the historic parkways in Massachusetts. So far, 13 MDC-controlled parkways have been identified and nominated for inclusion in the National Registry of Historic Places and are expected to be accepted, including the Fresh Pond Parkway and Fellsmere Park Parkways. It is recommended that both the Mystic Valley Parkway and the Alewife Brook Parkway be included in the next round of nominations to protect them from further development and infringement.

EPILOGUE



This Master Plan presents an ambitious program for watershed stewardship. Its success will depend on the continued, dedicated efforts of the MDC, concerned citizens, and local and state officials. The implementation of these recommendations would result in an ecologically and socially vibrant urban wild and greenway. This would be a new park system link strengthening Charles Eliot's century-old vision of a continuous network of open spaces throughout the suburbs of metropolitan Boston.

"We abuse land because we see it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect."

(Aldo Leopold)

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FIGURE 1:	The Bioengineering Group
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FIGURE 49:	The Bioengineering Group
FIGURE 50:	The Bioengineering Group
FIGURE 51:	The Bioengineering Group
FIGURE 52:	The Bioengineering Group
FIGURE 53:	The Bioengineering Group
FIGURE 54:	City of Cambridge (The Bioengineering Group)
FIGURE 55:	Roger Frymire, Mystic River Watershed Association
FIGURE 56:	The Bioengineering Group
FIGURE 57:	The Bioengineering Group
FIGURE 58:	The Bioengineering Group
FIGURE 59:	The Bioengineering Group
FIGURE 60:	The Bioengineering Group
FIGURE 61:	The Bioengineering Group
FIGURE 62:	Carol R. Johnson Associates
FIGURE 62:	The Bioengineering Group
FIGURE 63:	The Bioengineering Group
FIGURE 64:	Carol R. Johnson Associates
FIGURE 65:	Carol R. Johnson Associates
FIGURE 66:	
FIGURE 67:	The Bioengineering Group
FIGURE 68:	Carol R. Johnson Associates
FIGURE 69:	The Bioengineering Group
FIGURE 70:	Friends of the Alewife Reservation
FIGURE 71:	Ellen Mass, Friends of the Alewife Reservation
FIGURE 72:	The Bioengineering Group
FIGURE 73:	Ellen Mass, Friends of the Alewife Reservation
FIGURE 74:	Roger Frymire, Mystic River Watershed Association
FIGURE 75:	The Bioengineering Group
FIGURE 76:	The Bioengineering Group
FIGURE 77:	The Bioengineering Group
FIGURE 78:	Dan Driscoll, Metropolitan District Commission
FIGURE 79:	The Bioengineering Group
FIGURE 80:	Bryce Nesbitt, Friends of the Path

APPENDIX A - EXISTING FLORA AND FAUNA

The following plants and animals have been observed in Alewife Reservation and Alewife Brook Parkway. After this inventory was completed in spring 2002, additional species not included below were observed during the 2002 Biodiversity Days species census. The superscript numbers behind the common name depict the source documents listed at the end of this appendix.

PLANTS

List 1. Plants observed in the Reservation/Parkway.

SCIENTIFIC NAME	COMMON NAME
<u>Aquatic Plants</u>	
<i>Elodea canadensis</i>	Waterweed
<i>Lemna</i> sp.	Duckweed ⁹
<i>Myriophyllum</i> sp.	Water Milfoil ⁴
<i>Potamogeton</i> sp.	Pondweed ^{4, 14}
<i>Trapa natans</i>	Water Chestnut ^{2, 14} (Invasive)
<i>Utricularia vulgaris</i>	Common Bladderwort
<u>Ferns</u>	
<i>Onoclea sensibilis</i>	Sensitive Fern ^{2, 14}
<u>Mushrooms</u>	
<i>Pleurotus ostreatus</i>	Oyster Mushroom ²
<i>Polyporus squamosus</i>	Dryads Saddle Mushroom ²
<u>Grasses, Sedges, and Rushes</u>	
<i>Carex stricta</i>	Tussock Sedge ¹⁴
<i>Cortaderia</i> sp.	*Pampas Grass ⁹
<i>Juncus effuses</i>	Soft Rush ²
<i>Phalaris arundinaceae</i>	Reed Canary Grass ¹⁴
<i>Phragmites australis</i>	Common reed ¹ (Invasive)
<i>Scirpus validus</i>	Giant Bulrush ¹⁴

Typha latifolia
Zizania sp.

Common Cattail^{9, 14}
Wild Rice¹

Herbaceous Plants

Achillea millefolium
Agalinis sp.
Ambrosia artemisiifolia
Anagallis sp.
Arabis sp.
Arctium minus
Aruncus dioicus
Asclepias syriaca
Aster novae-angliae
Aster sp.
Aster vimineus
Barbarea vulgaris
Barbarea vulgaris
Calendula officinalis
Calystegia sepium
Centaurea maculosa
Cerastium vulgatum
Chelidonium majus
Chelone sp.
Chenopodium album
Chrysanthemum leucanthemum
Chrysosplenium americanum
Cichorium intybus
Coreopsis sp.
Daucus carota
Dipsacus sylvestris
Echinocystis lobata
Equisetum arvense
Equisetum sp.
Erigeron strigosus
Eupatorium sp.
Euphorbia esula
Galium aparine
Gentiana sp.
Geum aleppicum
Glechoma hederacea
Helianthus tuberosus
Hesperis matronalis
Hypericum sp.
Impatiens capensis
Iris prismatica
Iris pseudacorus
Lactuca scariola

Yarrow; Milfoil²
Gerardia²
Common Ragweed¹⁴
Scarlet Pimpernel⁹
Rock Cress²
Common Burdock¹⁴
Goatsbeard⁹
Common Milkweed²
N.E. Aster¹⁴
Asters²
Small White Aster¹⁴
Winter Cress²
Yellow Rocket²
Ragweed²
Hedge Bindweed²
Spotted Knapweed²
Mouse-ear Chickweed²
Celadine⁹
Turtlehead; Snakehead²
Lamb's Quarters⁹
Oxeye Daisy²
Golden saxifrage⁹
Chicory²
Coreopsis²
Queen Anne's Lace^{2, 14}
Teasel⁹
Wild Cucumber²
Field Horsetail¹⁴
Horsetail²
Daisy Fleabane²
Joe-pye-weed²
Leafy Spurge²
Cleavers; Bedstraw²
Soapwort²
Yellow Avens⁹
Ground Ivy⁹
Jerusalem Artichoke²
Dame's Rocket² (Invasive)
St. John's Wort²
Jewelweed^{2, 14}
Slender Blue Flag²
Yellow Iris²
Prickly Lettuce⁹

<i>Lamium</i> sp.	Nettle ²
<i>Lychnis alba</i>	Evening Lychnis; White Campion ²
<i>Lythrum salicaria</i>	Purple Loosestrife ^{2, 14} (Invasive)
<i>Maianthemum canadense</i>	Canada Mayflower ²
<i>Malva neglecta</i>	Cheese Mallow ⁹
<i>Medicago sativa</i>	Alfalfa ⁹
<i>Melilotus alba</i>	White Sweet Clover ⁹
<i>Melilotus officinalis</i>	Yellow Sweet Clover ²
<i>Mentha piperita</i>	Wild Peppermint ²
<i>Mirabilis nyctaginea</i>	Wild Four O'Clock ⁹
<i>Oenothera biennis</i>	Evening Primrose ²
<i>Oenothera</i> sp.	Primrose ⁴
<i>Oenothera</i> sp.	Sundrops ²
<i>Oxalis montana</i>	Common Wood Sorrel ⁹
<i>Parthenocissus quinquefolia</i>	Virginia Creeper ^{9, 14}
<i>Phytolacca americana</i>	Pokeweed ²
<i>Plantago lanceolata</i>	English Plantain ⁹
<i>Polygonum amphibium</i>	Water Smartweed; Water Lady's Thumb ²
<i>Polygonum lapathifolium</i>	Nodding Smartweed ¹⁴
<i>Polygonum pennsylvanicum</i>	Pinkweed ¹⁴
<i>Pontederia cordata</i>	Pickrel Weed ^{2, 14}
<i>Potentilla</i> sp.	Rough-fruited Cinquefoil ²
<i>Potentilla</i> sp.	Silvery Cinquefoil ²
<i>Ranunculus repens</i>	Creeping Buttercup ⁸
<i>Rhus radicans</i>	Poison Ivy ^{1, 14}
<i>Rumex acetosella</i>	Sheep's sorrel ⁹
<i>Rumex crispus</i>	Curley dock ⁹
<i>Sagittaria latifolia</i>	Arrowhead ²
<i>Solanum dulcamara</i>	Deadly Nightshade ⁹
<i>Solanum nigrum</i>	Black Nightshade ¹⁴
<i>Solidago canadensis</i> v. <i>scabra</i>	Tall Goldenrod ¹⁴
<i>Solidago</i> sp.	Goldenrod ²
<i>Spiraea alba</i> var. <i>latifolia</i>	Broadleaf Meadowsweet ¹⁴
<i>Spiraea ulmaria</i>	Meadowsweet ²
<i>Stellaria graminea</i>	Lesser Stitch Wort ⁹
<i>Stellaria</i> sp.	Chickweed ⁹
<i>Symplocarpus foetidus</i>	Skunk Cabbage ²
<i>Tanacetum</i> sp.	Yellow Tansy ²
<i>Tanacetum vulgare</i>	Common Tansy ²
<i>Taraxacum officinale</i>	Common Dandelion ²
<i>Taraxacum</i> sp.	Dandelion ⁹
<i>Tauschia</i> sp.	Umbrella Wort ²
<i>Thalictrum</i> sp.	Meadow Rue ²
<i>Trifolium agrarium</i>	Hop clover ⁹
<i>Trifolium arvense</i>	Rabbit-foot Clover ²
<i>Trifolium dubium</i>	Least Hop Clover ⁹
<i>Trifolium hybridum</i>	Alsike Clover ⁹

Trifolium pratense
Trifolium repens
Triodanis perfoliata
Urtica dioica
Verbascum sp.
Verbena sp.
Vicia cracca
Vicia sp.
Vinca minor
Viola papilionaceae

Red Clover^{2, 14}
 White Clover^{9, 14}
 Venus Looking Glass²
 Stinging Nettle¹⁴
 Mullein²
 Vervain²
 Cow Vetch⁹
 Purple Vetch²
 Periwinkle¹⁴
 Common Violet¹⁴

Trees and Shrubs

Acer negundo
Acer platanoides
Acer rubrum
Acer saccharinum
Ailanthus altissima
Alnus rugosa
Amelanchier canadensis
Amorpha sp.
Berberis thunbergii
Betula populifolia
Catalpa sp.
Cornus alternifolia
Cornus amomum
Cornus racemosa
Cornus stolonifera
Fagus grandifolia
Fraxinus americana
Fraxinus sp.
Gleditsia triacanthos
Juniperus communis
Juniperus virginiana
Lonicera tatarica
Malus pumila
Malus sylvestris
Morus alba
Myrica pensylvanica
Picea mariana
Pinus resinosa
Polygonum vacinifolium
Populus deltoides
Populus spp.
Populus tremuloides
Prunus pensylvanica
Prunus serotina
Pyrus coronaria

Black Elder¹⁴
 Norway Maple^{9, 14} (Invasive)
 Red Maple^{4, 14}
 Silver Maple^{1, 14}
 Tree of Heaven¹⁴
 Speckled Alder^{8, 14}
 Juneberry²; Shadbush
 Indigo Bush²
 Japanese Barberry¹⁴
 Gray Birch^{1, 14}
 Catalpa⁹
 Alternate-leaved Dogwood¹⁴
 Silky Dogwood^{2, 14}
 Gray-stemmed Dogwood¹⁴
 Red-osier Dogwood^{2, 14}
 American Beech¹
 White Ash¹⁴
 Ash
 Honey Locust⁹
 Juniper¹⁴
 Eastern Red Cedar⁹
 Tartarian Honeysuckle^{8, 14}
 Domestic Apple¹⁴
 Common Apple¹
 White Mulberry^{9, 14}
 Bayberry²
 Black Spruce¹⁴
 Red Pine¹⁴
 Japanese Knotweed^{2, 7, 14} (Invasive)
 Cottonwood¹⁴
 Poplar¹
 Quaking Aspen^{9, 14}
 Pin Cherry
 Black Cherry¹⁴
 Crabapple²

<i>Pyrus sp.</i>	Choke Berry ⁸
<i>Quercus alba</i>	White Oak ¹⁴
<i>Quercus palustris</i>	Pin Oak ^{9, 14}
<i>Quercus rubra</i>	Red Oak ¹⁴
<i>Quercus sp.</i>	Oak
<i>Rhamnus cathartica</i>	European Buckthorn ⁹ (Invasive)
<i>Rhus typhina</i>	Staghorn Sumac ^{2, 14}
<i>Ribes sp.</i>	Wild Gooseberry ⁹
<i>Ribes sp.</i>	Currant ⁴
<i>Robinia pseudoacacia</i>	Black Locust ¹⁴
<i>Rosa multiflora</i>	Rose ^{9, 14} (Invasive)
<i>Rosa rugosa</i>	Wild Rose ²
<i>Rubus allegheniensis</i>	Blackberry ¹⁴
<i>Rubus hispidus</i>	Dewberry ²
<i>Rubus sp.</i>	Raspberries ⁹
<i>Salix alba</i>	White Willow ^{9, 14}
<i>Salix babylonica</i>	Weeping Willow ⁹
<i>Salix discolor</i>	Pussy Willow ^{2, 14}
<i>Salix nigra</i>	Black Willow
<i>Sambucus canadensis</i>	Elderberry ^{2, 14}
<i>Sorbus americana</i>	Mountain Ash ²
<i>Tsuga canadensis</i>	Hemlock ¹⁴
<i>Ulmus americana</i>	American Elm ^{9, 14}
<i>Ulmus serotina</i>	Slippery Elm ¹⁴
<i>Vaccinium corymbosum</i>	Highbush blueberry ^{9, 14}
<i>Viburnum recognitum</i>	Arrowwood ⁹
<i>Viburnum sp.</i>	Maple Leaf Viburnum ¹
<i>Viburnum sp.</i>	Northern Arrowwood ¹⁴
<i>Vitis aestivalis</i>	Summer Grape ¹⁴
<i>Vitis labrusca</i>	Fox Grape ²
<i>Vitis riparia</i>	Riverbank Grape ¹⁴
<i>Vitis sp.</i>	Concord Grapes ²

FISH

List 2. Fish observed in the Reservation/Parkway.

SCIENTIFIC NAME	COMMON NAME
<i>Alosa aestivalis</i>	Blueback Herring
<i>Alosa pseudoharengus</i>	Alewife
<i>Carassius auratus</i>	Goldfish
<i>Cyprinus carpio</i>	Common Carp (Invasive)
<i>Lepomis gibbosus</i>	Pumpkinseed
<i>Lepomis macrochirus</i>	Bluegill
<i>Micropterus salmoides</i>	Largemouth Bass (Invasive)
<i>Perca flavescens</i>	Yellow Perch

BIRDS

List 3. Birds observed in the Reservation/Parkway. This list includes breeding and migratory species.

SCIENTIFIC NAME	COMMON NAME
<i>Podilymbus podiceps</i>	Pied-billed Grebe ²
<i>Phalacrocorax auritus</i>	Double-crested Cormorant ^{2, 16}
<i>Anas chipeata</i>	Northern Shoveler ^{12, 16}
<i>Anas platyrhynchos</i>	Mallard Duck ^{2, 16}
<i>Anas discors</i>	Green-winged Teal ^{5, 16}
<i>Anas rubripes</i>	Black Duck ^{2, 16}
<i>Aix sponsa</i>	Wood Duck ^{2, 16}
<i>Branta cabadensis</i>	Canada Goose ^{2, 16}
<i>Cygnus olor</i>	Mute Swan ^{2, 16}
<i>Lophodytes cucullatus</i>	Hooded Merganser ¹⁶
<i>Mergus merganser</i>	Common Merganser ^{2, 16}
<i>Larus argentatus</i>	Herring Gull ^{4, 16}
<i>Larus delawarensis</i>	Ring-billed Gull ^{12, 16}
<i>Larus marinus</i>	Greater Black-backed Gull ¹⁶
<i>Ardea herodias</i>	Great Blue Heron ^{1, 16}
<i>Butorides striatus</i>	Green Heron ²
<i>Botaurus lentiginosus</i>	American Bittern ²
<i>Botaurus lentiginosus</i>	Least Bittern ¹⁷
<i>Nycticorax nycticorax</i>	Black-crowned Night Heron ^{1, 16}
<i>Nyctanassa violacea</i>	Yellow-crowned Night Heron ⁴
<i>Fulica americana</i>	American Coot ²
<i>Gallinula chloropus</i>	Common Gallinule ²
<i>Prozana carolina</i>	Sora Rail ²
<i>Charadrius vociferous</i>	Killdeer ^{2, 16}
<i>Actitis macularia</i>	Spotted Sandpiper ¹
<i>Calidris minutilla</i>	Least Sandpiper ¹⁶
<i>Philohela minor</i>	American Woodcock ^{1, 16}
<i>Tringa solitaria</i>	Solitary Sandpiper ¹⁶
<i>Meleagris gallopavo</i>	Wild Turkey ¹
<i>Bonasa umbellus</i>	Ruffed Grouse ²
<i>Phasianus colchicus</i>	Ring-necked Pheasant ^{2, 16}
<i>Buteo jamaicensis</i>	Red Tailed Hawk ^{2, 16}
<i>Haliaeetus leucocephalus</i>	Bald Eagle ¹⁷
<i>Pandion haliaetus</i>	Osprey ²
<i>Accipiter cooperii</i>	Cooper's Hawk ¹¹
<i>Accipiter striatus</i>	Sharp-shinned Hawk ^{9, 16}
<i>Falco sparverius</i>	American Kestrel ^{4, 16}
<i>Falco columbarius</i>	Merlin ¹⁶
<i>Falco peregrinus</i>	Peregrine Falcon
<i>Aegolius acadicus</i>	Saw-whet Owl ⁴
<i>Bubo virginianus</i>	Great Horned Owl ²

<i>Otus asio</i>	Common Screech Owl ¹
<i>Columba livia</i>	Rock Dove ^{9, 16}
<i>Zenaidura macroura</i>	Mourning Dove ^{4, 16}
<i>Chordeiles minor</i>	Nighthawk ¹⁶
<i>Megasceryle alcyon</i>	Belted Kingfisher ^{2, 16}
<i>Colaptes sp.</i>	Flicker ^{4, 16}
<i>Picoides pubescens</i>	Downy Woodpecker ^{4, 16}
<i>Picoides villosus</i>	Hairy Woodpecker ¹⁶
<i>Contopus virens</i>	Eastern Pewee ⁴
<i>Empidonax traillii</i>	Willow Fly-catcher ^{2, 16}
<i>Empidonax minimus</i>	Least Flycatcher ¹⁶
<i>Sayornis phoebe</i>	Eastern Phoebe ^{4, 16}
<i>Tyrannus sp.</i>	Kingbird ⁹
<i>Tyrannus tyrannus</i>	Eastern Kingbird ^{4, 16}
<i>Iridoprocne bicolor</i>	Tree Swallow ^{4, 16}
<i>Stelgidopteryx ruficollis</i>	Rough-winged Swallow ¹⁶
<i>Chaetura pelagica</i>	Chimney Swift ^{4, 16}
<i>Corvus brachyrhynchos</i>	American Crow ^{4, 16}
<i>Cyanocitta cristata</i>	Blue Jay ^{4, 16}
<i>Parus atricapillus</i>	Black-capped Chickadee ^{4, 16}
<i>Parus bicolor</i>	Tufted Titmouse ^{4, 16}
<i>Sitta carolinensis</i>	White-breasted Nuthatch ^{4, 16}
<i>Certhia familiaris</i>	Brown Creeper ¹⁶
<i>Thryothorus ludovicianus</i>	Carolina Wren ^{11, 16}
<i>Troglodytes aedon</i>	House Wren ^{4, 16}
<i>Regulus calendula</i>	Ruby-crowned Kinglet ¹⁶
<i>Dumetella carolinensis</i>	Grey Catbird ^{4, 16}
<i>Mimus polyglottos</i>	Northern Mockingbird ^{9, 16}
<i>Hylocichla mustelina</i>	Wood Thrush ¹⁶
<i>Turdus migratorius</i>	American Robin ^{1, 16}
<i>Bombycilla cedrorum</i>	Cedar Waxwing ^{1, 16}
<i>Vireo gilvus</i>	Warbling Vireo ^{2, 16}
<i>Vireo griseus</i>	White-eyed Vireo ¹⁶
<i>Vireo olivaceus</i>	Red-eyed Vireo ¹⁶
<i>Dendroica petechia</i>	Yellow Warbler ^{1, 16}
<i>Dendroica magnolia</i>	Magnolia Warbler ¹⁶
<i>Dendroica sp.</i>	Black-throated Warbler ¹⁶
<i>Dendroica coronata</i>	Myrtle, or Yellow-rumped Warbler ¹⁶
<i>Dendroica virens</i>	Black-throated Green Warbler ¹⁶
<i>Dendroica fusca</i>	Blackburnian Warbler ¹⁶
<i>Dendroica pensylvanica</i>	Chestnut-sided Warbler ¹⁶
<i>Dendroica striata</i>	Blackpoll Warbler ¹⁶
<i>Dendroica discolor</i>	Prairie Warbler ¹⁶
<i>Dendroica palmarum</i>	Palm Warbler ¹⁶
<i>Geothlypis trichas</i>	Common Yellowthroat ^{2, 16}
<i>Icteria virens</i>	Yellow-breasted Chat ¹⁷
<i>Mniotilta varia</i>	Black and White Warbler ¹⁶

<i>Parula americana</i>	Northern Parula ¹⁶
<i>Seiurus noveboracensis</i>	Northern Waterthrush ¹⁶
<i>Setophaga ruticilla</i>	American Redstart ¹⁶
<i>Wilsonia pusilla</i>	Wilson's Warbler ¹⁶
<i>Wilsonia canadensis</i>	Canada Warbler ¹⁶
<i>Agelaius phoeniceus</i>	Red-winged Blackbird ^{2, 16}
<i>Icterus galbula</i>	Baltimore Oriole ^{9, 16}
<i>Icterus galbula</i>	Northern Oriole ⁴
<i>Molothrus ater</i>	Brown-headed Cowbird ^{4, 16}
<i>Quiscalus quiscula</i>	Common Grackle ^{4, 16}
<i>Sturnus vulgaris</i>	European Starling ^{9, 16}
<i>Passar domesticus</i>	House Sparrow ^{9, 16}
<i>Cardinalis cardinalis</i>	Northern Cardinal ^{4, 9, 16}
<i>Carduelis sp.</i>	Red Poll ^{11, 16}
<i>Carduelis tristis</i>	American Goldfinch ^{2, 16}
<i>Carpodacus mexicanus</i>	House Finch ^{4, 16}
<i>Junco hyemalis</i>	Northern Junco ^{4, 16}
<i>Melospiza lincolnii</i>	Lincoln's Sparrow ^{1, 16}
<i>Melospiza melodia</i>	Song Sparrow ^{2, 16}
<i>Melospiza georgiana</i>	Swamp Sparrow ¹⁶
<i>Passerculus sandwichensis</i>	Savannah Sparrow ^{4, 16}
<i>Passerina cyanea</i>	Indigo Bunting ^{4, 16}
<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak
<i>Spizella pusilla</i>	Field Sparrow ¹⁶
<i>Zonotrichia albicollis</i>	White-throated Sparrow ^{4, 16}
<i>Zonotrichia leucophrys</i>	White-crowned Sparrow ⁴
<i>Ammodramus savannarum</i>	Grasshopper Sparrow ¹⁷
<i>Pooecetes gramineus</i>	Vesper Sparrow ¹⁷

MAMMALS

List 4. Mammals observed in the Reservation/Parkway.

SCIENTIFIC NAME	COMMON NAME
<i>Canis latrans</i>	Eastern Coyote ¹⁵
<i>Urocyon sp.</i>	Red Fox ¹
<i>Procyon lotor</i>	Raccoon ¹
<i>Mephitis sp.</i>	Skunk ⁴
<i>Castor canadensis</i>	Beaver ¹⁵
<i>Ondatra zibethica</i>	Muskrat ¹
<i>Lutra canadensis</i>	River Otter ¹
<i>Mustela vison</i>	Mink ¹
<i>Mustela frenata</i>	Long-tailed weasel ¹⁵
<i>Felis domesticus</i>	Domestic Cat ¹⁵ (Introduced)
<i>Odocoileus virginianus</i>	White-tailed Deer ¹⁵
<i>Sylvilagus sp.</i>	Cottontail Rabbit ²
<i>Marmota monax</i>	Woodchuck ¹⁵

<i>Sciurus carolinensis</i>	Gray Squirrel ⁹
<i>Eutamias sp.</i>	Chipmunk ¹⁵
<i>Blarina brevicauda</i>	Short-tailed Shrew ¹⁵
<i>Microtus pennsylvanicus</i>	Meadow Vole ¹⁵
<i>Microtus sp.</i>	Field Mouse ¹
<i>Peromyscus leucopus</i>	White-footed Mouse ¹⁵
<i>Rattus norvegicus</i>	Norway Rat ¹⁵ (Introduced)

REPTILES

List 5. Reptiles observed in the Reservation/Parkway.

SCIENTIFIC NAME	COMMON NAME
<i>Thamnophis sp.</i>	Garter Snake ²
<i>Opheodrys vernalis</i>	Smooth Green Snake ⁴
<i>Chelydra serpentina</i>	Snapping Turtle ¹
<i>Chrysemys picta</i>	Painted Turtle ¹

INSECTS

List 6. Insects observed in the Reservation/Parkway.

SCIENTIFIC NAME	COMMON NAME
<i>Bombinae sp.</i>	Bumblebee ⁹
<i>Aphrophora sp.</i>	Spittle Bug ⁹
	Skipper ⁹
<i>Photinus pyralis</i>	Firefly ⁹
<i>Sympetrum rubicundulum</i>	Ruby Meadowhawk ¹⁰
<i>Danaus plexippus</i>	Monarch Butterfly ²
<i>Vanessa atalanta</i>	Red Admiral ⁹
<i>Papilio glaucus</i>	Eastern Tiger Swallowtail ⁹
<i>Vespula sp.</i>	Hornet ⁹

RARE, ENDANGERED, AND/OR PROTECTED SPECIES

There are no official records of Federally or State-listed rare, endangered or protected species in the Reservation and Parkway (MA Natural Heritage and Endangered Species Program, letter of Jan 3, 2002). However, rare or endangered bird species have been observed in the Alewife area and are listed in Table 7 below.

List 7. Federally or State-listed rare, endangered or protected bird species observed in the Alewife area. Note that none of these species are recorded in the Natural Heritage and Endangered Species Program database.

SCIENTIFIC NAME	COMMON NAME	STATUS
<i>Podilymbus podiceps</i>	Pied-billed Grebe ²	State-listed, Endangered
<i>Botaurus lentiginosus</i>	American Bittern ²	State-listed, Endangered
<i>Ixobrychus exilis</i>	Least Bittern	State-listed, Endangered
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Federally-listed, Threatened
<i>Falco peregrinus</i>	Peregrine Falcon	Federally and State-listed, Endangered
<i>Accipiter cooperii</i>	Cooper's Hawk ¹¹	State-listed, Species of Special Concern
<i>Accipiter striatus</i>	Sharp-shinned Hawk ⁹	State-listed, Species of Special Concern
<i>Dendroica striata</i>	Blackpoll Warbler ¹⁶	State-listed, Species of Special Concern
<i>Parula americana</i>	Northern Parula ^{16, 17}	State-listed, Threatened
<i>Ammodramus savannarum</i>	Grasshopper Sparrow ¹⁷	State-listed, Threatened
<i>Pooecetes gramineus</i>	Vesper Sparrow ¹⁷	State-listed, Threatened
<i>Icteria virens</i>	Yellow-breasted Chat ¹⁷	State-listed, Endangered (in Connecticut)

¹ *The Alewife Reservation Pamphlet*. Friends of the Alewife Reservation.

² *An Alewife Ecology Guide*. Mystic River Watershed Association. 1994.

³ *Stormwater Design for MDC Parkways*. MDC Planning Office. 2000.

⁴ *The Alewife Open Space Plan*. Metropolitan Area Planning Council. 1985.

⁵ *Alchemy at Alewife, Reservation Inventory*. Special Issue of the North Cambridge News. June 1995.

⁶ *Alewife Reservation Gains More Friends*. Cambridge Chronicle, VOL.155, No. 35, pg.11, July 4, 2001.

⁷ *A Master Plan for Segments of the Alewife Brook and Mystic Valley Parkways*. MDC. July 1996.

⁸ *Resource Area Delineation and Evaluation at Little River and Alewife Brook, Cambridge*. BSC Group. 2000.

⁹ *Biodiversity Days 2001: Species list for Alewife Reservation*. Submitted to the MA Executive Office of Environmental Affairs. Friends of Alewife Reservation. 2001.

¹⁰ Roger Frymire, Mystic River Water Association Project Coordinator.

- ¹¹ *Holiday Family Walk: Bird Sightings*. Friends of Alewife Reservation. Email of January 10, 2002.
- ¹² *Local Alewife Events and FAR Updates*. Friends of Alewife Reservation email.
- ¹³ *Non-native Fishes Known from Massachusetts*. Occ. Reps. MCZ Fish Dept. 2:9pp. Updated by K.E. Hartel. June 1995.
- ¹⁴ *Blair Pond Master Plan*. MDC. 1999.
- ¹⁵ *Mammal Tracking Survey*. David Brown, for Friends of Alewife Reservation. 2002.
- ¹⁶ *Migrant and Breeding Bird Survey Alewife Reservation*. David Brown, for Friends of Alewife Reservation. 2002.
- ¹⁷ Ralph Yoder, wildlife activist, conversations February 2003

APPENDIX B - PLANT LISTS

The following lists provide a selection of mostly native plant species recommended for use in the project area and should be used as guidance for future plantings. Several ornamental species have been included for use in more parklike settings in prominent areas along the Parkway. A list of invasive species that should not be planted is also included. These species are not native to Massachusetts, invade native plant communities, exhibit vigorous growth and thus dominate over slow growing native plants forming monocultures with low habitat value.

A mixture of different plant characteristics and planting techniques can be used to achieve desired results. For restoration areas, especially in the Reservation, the use of live stakes (dormant cuttings), saplings, and tubelings can be a cost-efficient method for establishing successional plant communities. Other innovative planting techniques such as pre-vegetated coir mattresses (herbaceous plants pre-grown in a coconut fiber substrate in a nursery) can be used in areas where rapid plant cover is desired to prevent erosion and limit soil disturbance. Plantings should incorporate a large variety of species to strengthen the goal of creating diverse habitats.

WET MEADOW SEED MIX

SCIENTIFIC NAME

*Andropogon gerardii**
*Asclepias incarnata**
*Aster laevis**
*Aster novae-angliae**
Avena sativa
*Carex stipata**
*Carex stricta**
*Elymus canadensis**
*Elymus virginicus**
*Eupatorium fistulosum**
*Eupatorium perfoliatum**
Juncus effusus var. *solutus**
Lobelia cardinalis *
*Monarda fistulosa**
*Panicum virgatum**
*Scirpus cyperinus**

COMMON NAME

Big Bluestem
 Swamp Milkweed
 Smooth Aster (BA)
 New England Aster (BA)
 Seed Oats
 Awl Sedge
 Tussock Sedge
 Canada Wild Rye (BA)
 Virginia Wild Rye (BA)
 Joe Pye Weed (BA)
 Boneset
 Soft Rush
 Cardinal Flower
 Wild Bergamot (BA)
 Switchgrass (BA)
 Wool Grass

*Sorghastrum nutans**

*Verbena hastata**

Indiangrass

Blue Vervain (BA)

DRY MEADOW SEED MIX

SCIENTIFIC NAME

*Andropogon gerardii**

*Asclepias syriaca**

*Asclepias tuberosa**

*Aster laevis**

*Aster lateriflorus**

*Aster novae-angliae**

*Chamaecrista fasciculata**

*Coreopsis rosea**

*Desmodium canadense**

*Elymus canadensis**

*Elymus villosus**

*Festuca rubra rubra**

*Lespedeza capitata**

*Lupinus perennis**

*Monarda fistulosa**

*Panicum virgatum**

*Poa palustris**

Rudbeckia hirta

*Schizachyrium scoparium**

*Solidago canadensis**

*Solidago juncea**

*Sorghastrum nutans**

*Verbena hastata**

COMMON NAME

Big Bluestem

Common Milkweed

Butterflyweed

Smooth Aster

Calico Aster

New England Aster

Partridge Pea

Rose Coreopsis

Showy Tick Trefoil

Canada Wild Rye

Silky Wild Rye

Creeping Red Fescue

Roundheaded Bush Clover

Wild Blue Lupine

Wild Bergamot

Switchgrass (BA)

Fowl Meadow Bluegrass (BA)

Black-Eyed Susan (BA)

Little Bluestem (BA)

Canada Goldenrod

Early Goldenrod

Indiangrass

Blue Vervain

PARKWAY LOW-MOW TURF SEED MIX

SCIENTIFIC NAME

Avena sativa / *Lolium multiflorum*

Festuca rubra rubra

(‘Jasper II’, ‘Shademaster II’,

‘Salsa’, ‘Pathfinder’)

Festuca elatior arundinacea

(‘Rembrandt’, ‘Millenium’,

‘Masterpiece’, ‘Plantation’)

COMMON NAME

Seed Oats/Annual Rye

Creeping Red Fescue (SH)

Turf Type Tall Fescue

New and better turf varieties are developed and become available on the market at a rapid pace. Therefore, the following guidelines should be considered when specifying a seed mix: (1) a combination of at least four varieties of turf type tall fescues should be used, as currently recommended by the University of Massachusetts or University of Rhode Island; (2) a small amount of seed oats or annual rye should be added when immediate erosion control is required; and (3) the amount of creeping red fescue should be increased in shady locations.

WOODLAND/RIPARIAN SEED MIX

SCIENTIFIC NAME

*Anemone virginiana**
*Aquilegia canadensis**
*Arisaema triphyllum**
*Aster divaricatus**
*Aster macrophyllus**
*Aster pilosus**
*Aster prenanthoides**
*Carex comosa**
*Carex vulpinoidea**
*Caulophyllum thalictroides**
*Cimicifuga racemosa**
*Elymus riparius**
*Elymus virginicus**
*Eupatorium maculatum**
*Eupatorium perfoliatum**
*Geum laciniatum**
Juncus effusus var. *solutus**
*Mimulus ringens**
*Osmorhiza claytonii**
*Smilacina racemosa**
*Verbena hastata**

COMMON NAME

Thimbleweed
 Eastern Columbine
 Jack-In-The-Pulpit
 White Wood Aster
 Big Leave Aster
 Heath Aster
 Zig Zag Aster
 Cosmos Sedge
 Fox Sedge
 Late Blue Cohosh
 Black Cohosh
 Riverbank Wild Rye
 Virginia Wild Rye
 Spotted Joe Pye Weed
 Boneset
 Rough Avenas
 Soft Rush
 Monkey Flower
 Sweet Cicely
 False Salomon's Seal
 Blue Vervain

ORNAMENTAL PLANTINGS (PRIMARILY PARKWAY USE)

SCIENTIFIC NAME

Deciduous Canopy Trees

Acer rubrum 'October Glory'*
Acer saccharum 'Green Mountain'*
*Carya ovata**
Crataegus phaenopyrum
Crataegus viridis 'Winter King'
*Fraxinus pennsylvanica**
Liquidambar styraciflua
Nyssa sylvatica
*Ostrya virginiana**
*Quercus coccinea**
*Quercus rubra**
*Quercus velutina**
*Sassafras albidum**
Ulmus americana 'Valley Forge'*
Ulmus americana 'New Harmony'*

COMMON NAME

Swamp Red Maple (SA)
 Sugar Maple (SA) (FH)
 Shagbark Hickory
 Washington Hawthorn (FH)
 Green Hawthorn (FH)
 Green Ash (SA)
 Sweetgum (SA) (FH)
 Black Tupelo (SA) (FH)
 Ironwood (FH)
 Scarlet Oak (SA) (FH)
 Red Oak (SA) (FH)
 Black Oak (SA) (FH)
 Sassafras
 American Elm (SA) (FH)
 American Elm (SA) (FH)

SCIENTIFIC NAME**COMMON NAME****Evergreen Trees***Pinus nigra*

Austrian Pine (SA)

*Pinus resinosa**

Red Pine

*Pinus rigida**

Pitch Pine (SA)

*Pinus strobus**

White Pine

Sciadopitys verticillata

Japanese Umbrella Pine

Deciduous Flowering Understory Trees*Amelanchier* \times *grandiflora**

Apple Serviceberry

*Cornus alternifolia**

Alternate-leaf Dogwood

*Hamamelis virginiana**

Common Witchhazel

Malus 'Pink Princess'

Flowering Crabapple (SA)

Malus sargentii

Sargent Crabapple (SA)

Prunus sargentii

Sargent Cherry (SA)

Syringa reticulata

Japanese Tree Lilac (SA)

Deciduous Shrubs*Comptonia peregrina**

Sweetfern (SA)

*Ilex verticillata**

Winterberry (FH)

*Myrica pensylvanica**

Bayberry (SA)

*Vaccinium angustifolium**

Lowbush Blueberry

*Vaccinium corymbosum**

Highbush Blueberry

*Viburnum cassinoides**

Witherod Viburnum

Evergreen Shrubs*Ilex crenata convexa* 'Compacta'

Japanese Holly (SA)

Ilex glabra 'Compacta'

Inkberry (SA)

*Kalmia latifolia**

Mountain Laurel

Microbiota decussata

Russian Arborvitae

Rhododendron 'Scintillation'

Dexter Hybrid Rhododendron

Taxus baccata 'Repandens'

English Yew

Taxus \times *media* 'Wardii'

Anglojap Yew

Groundcovers*Arctostaphylos uva-ursi**

Bearberry

Hemerocallis 'Hyperion'

Daylily

Herbaceous Perennials*Aquilegia canadensis**

Wild Columbine

*Asarum canadensis**

Wild Ginger

*Aster laevis**

Smooth Aster

*Athyrium filix-femina**

Lady Fern

*Polystichum acrostichoides**

Christmas Fern

*Solidago speciosa**

Showy Goldenrod

RIPARIAN AND FLOODPLAIN PLANTINGS

SCIENTIFIC NAME

COMMON NAME

Deciduous Trees

<i>Acer rubrum</i> *	Swamp Red Maple (BA)
<i>Alnus rugosa</i> *	Speckled Alder (B)
<i>Betula lutea</i> *	Yellow Birch
<i>Betula nigra</i> *	River Birch (BA) (FH)
<i>Fraxinus americana</i> *	White Ash (BA)
<i>Larix laricina</i> *	Tamarack
<i>Nyssa sylvatica</i> *	Black Tupelo (BA) (FH)
<i>Populus deltoids</i> *	Cottonwood (B)
<i>Populus tremuloides</i> *	Quaking aspen
<i>Prunus serotina</i> *	Black Cherry
<i>Quercus bicolor</i> *	Swamp White Oak (FH)
<i>Quercus rubra</i> *	Red Oak (FH)
<i>Ulmus americana</i> 'Valley Forge'	American Elm (FH)

Woody Understory

<i>Aronia arbutifolia</i> *	Red Chokeberry (BA)
<i>Aronia melanocarpa</i> *	Black Chokeberry (BA)
<i>Amelanchier canadensis</i> *	Shadblow Serviceberry (BA)
<i>Hamamelis virginiana</i> *	Witch Hazel (BA)
<i>Cephalanthus occidentalis</i> *	Buttonbush (B)
<i>Clethra alnifolia</i> *	Summersweet (BA)
<i>Cornus amomum</i> *	Silky dogwood (B) (BA)
<i>Cornus racemosa</i> *	Gray dogwood (B)
<i>Cornus stolonifera</i> *	Red-osier Dogwood (B) (BA)
<i>Ilex verticillata</i> *	Winterberry (FH)
<i>Kalmia angustifolia</i> *	Sheep Laurel
<i>Lindera benzoin</i> *	Spicebush (BA)
<i>Rhododendron viscosum</i> *	Swamp Azalea
<i>Salix discolor</i> *	Pussy Willow (B)
<i>Salix nigra</i> *	Black Willow (B)
<i>Sambucus canadensis</i> *	Elderberry (B) (BA)
<i>Spirea latifolia</i> *	Meadow Sweet
<i>Vaccinium corymbosum</i> *	Highbush Blueberry (BA)
<i>Viburnum dentatum</i> *	Arrowwood (B) (BA)

Herbaceous Wetland Species

Deep Marsh

<i>Acorus calamus</i> *	Sweet Flag
<i>Pontederia cordata</i> *	Pickeralweed
<i>Sagittaria latifolia</i> *	Arrowhead
<i>Scirpus acutus</i> *	Hard Stem Bulrush
<i>Scirpus validus</i> *	Soft-stem Bulrush
<i>Sparganium americanum</i> *	Burreed
<i>Typha latifolia</i> *	Common Cattail
<i>Nuphar lutea</i>	Yellow Water Lily

Shallow Marsh

*Aster puniceus**

*Carex stricta**

*Eupatorium perfoliatum**

*Iris versicolor**

*Juncus canadensis**

Juncus effusus var. *solutus**

*Juncus tenuis**

*Scirpus atrovirens**

*Scirpus validus**

Swamp Aster

Tussock Sedge

Boneset

Blue Flag Iris

Canada Rush

Soft Rush

Path Rush

Green Bulrush

Soft-stem Bulrush

Herbaceous Understory

*Carex stricta**

*Carex vulpinodea**

*Chelone lyonii**

*Elymus canadensis**

*Eupatorium maculatum**

*Eupatorium perfoliatum**

*Glyceria canadensis**

*Iris versicolor**

*Juncus effusus**

*Juncus tenuis**

*Leersia oryzoides**

*Lobelia cardinalis**

*Onoclea sensibilis**

*Osmunda regalis**

*Osmunda cinnamomea**

*Scirpus cyperinus**

*Scirpus validus**

*Scirpus fluviatilis**

*Symplocarpus foetidus**

Tussock Sedge (SH)

Foxtail sedge

Pink Turtlehead (SH) (BA)

Canada Wildrye

Spotted Joe Pye Weed

Boneset

Canada manna-grass

Blue-flag Iris

Soft Rush

Path Rush

Rice Cutgrass

Cardinal Flower (SH)

Sensitive Fern (SH)

Royal Fern (SH)

Cinnamon Fern (SH)

Woolgrass

Giant Bulrush

River Bulrush

Skunk Cabbage (SH)

KEY

* Native plant in Massachusetts

(B) Plants suitable for bioengineering techniques such as live stakes and brush layers

(BA) Plants recommended for bioretention areas/raingardens

(SH) Shade tolerant plant species

(SA) Salt tolerant tree and shrub species suitable for planting along roadways

(FH) Fall Planting Hazard: Plants identified by Nurseries and Horticulture Institutes that suffer winter losses due to transplanting in fall season

INVASIVE SPECIES

The George Safford Torrey Herbarium, in Storrs, Connecticut, with input from other professionals and nursery representatives, has established several criteria for determining the invasiveness of non-native species. The criteria will be tested by research supported by grants from The Massachusetts Invasive Plant Working Group. The following is a provisional list of non-native invasive and potentially invasive plants in New England compiled by the Herbarium's Leslie J. Mehrhoff.

WIDESPREAD AND INVASIVE

SCIENTIFIC NAME

Ailanthus altissima (Mill.) Swingle
Alliaria petiolata (Bieb.) Cavara & Grande
Berberis thunbergii DC.
Celastrus orbiculatus Thunb.
Centaurea biebersteinii DC.
syn. *Centaurea maculosa* L.
Elaeagnus umbellata Thunb.
Euphorbia cyparissias L.
Fallopia japonica (Houtt.) Decraene
syn. *Polygonum cuspidatum* Sieb. & Zucc.
Frangula alnus Mill. syn.: *Rhamnus frangula* L.
Hesperis matronalis L.
Lonicera x bella Zabel
Lonicera morrowii A. Gray
Lythrum salicaria L.
Nasturtium officinale R. Br.
Phragmites australis (Cav.) Trin.
Rhamnus cathartica L.
Robinia pseudoacacia L.
Rosa multiflora Thunb.
Tussilago farfara L.
Vincetoxicum nigrum (L.) Moench
syn. *Cynanchum nigrum* (L.) Pers.
syn. *Cynanchum louiseae* Kartesz & Gandhi

COMMON NAME

Tree-of-heaven
Garlic mustard
Japanese barberry
Asiatic bittersweet
Spotted knapweed

Autumn olive
Cypress spurge
Japanese Knotweed

European Buckthorne
Dame's rocket
Bella honeysuckle
Morrow's honeysuckle
Purple loosestrife
Watercress
Common reed
Buckthorne
Black locust
Multiflora rose
Coltsfoot
Black swallow-wort

RESTRICTED AND INVASIVE

SCIENTIFIC NAME

Aegopodium podagraria L.
Ampelopsis brevipedunculata (Maxim.) Trautv.
Butomus umbellatus L.
Cabomba caroliniana A. Gray
Cardamine impatiens L.
Egeria densa Planchon

COMMON NAME

Goutweed
Porcelain berry
Flowering rush
Fanwort

Brazilian water-weed

Euonymus alatus (Thunb.) Sieb.
Glyceria maxima (Hartman) Holmburg
Iris pseudacorus L.
Lepidium latifolium L.
Lonicera japonica Thunb.
Lysimachia nummularia L.
Lysimachia vulgaris L.
Microstegium vimineum (Trin.) A. Camus
 syn.: *Eulalia viminea* (Trin.) Kuntze
Myriophyllum heterophyllum Michx.
Myriophyllum spicatum L.
Polygonum perfoliatum L.
Potamogeton crispus L.
Rubus phoenicolasias Maxim.
Trapa natans L.
Vincetoxicum rossicum (Kleo.) Barb.
 syn.: *Cynanchum rossicum* (Kleo.) Borhidi

Winged euonymus
 Tall mannagrass
 Yellow iris
 Tall pepperweed
 Japanese honeysuckle
 Moneywort
 Garden loosestrife
 Japanese stilt grass

 Variable water-milfoil
 European water-milfoil
 Mile-a-minute vine
 Crispy-leaved pondweed
 Wineberry
 Water chestnut
 Pale swallow-wort

POTENTIALLY INVASIVE

SCIENTIFIC NAME

Acer ginnala L.
Acer platanoides L.
Acer pseudoplatanus L.
Aira caryophyllea L.
Allium vineale L.
Alnus glutinosa (L.) Gaertner
Amorpha fruticosa L.
Anthriscus sylvestris (L.) Hoffm.
Arthraxon hispidus (Thunb.) Makino
Berberis vulgaris L.
Bromus tectorum L.
Callitriche stagnalis Scop.
Cirsium arvense (L.) Scop.
Cirsium palustre (L.) Scop.
Datura stramonium L.
Elaeagnus angustifolia L.
Elsholtzia ciliata (Thunb.) Hylander
Epilobium hirsutum L.
Euphorbia esula L.
Froelichia gracilis (Hook.) Moq.
Geranium nepalense Sweet
Glechoma hederacea L.
Humulus japonicus Sieb. & Zucc.
Hydrilla verticillata (L. f.) Royle
Hydrocharis morsus-ranae L.
Hypericum prolificum L.

COMMON NAME

Amur maple
 Norway maple
 Sycamore maple
 Silver hairgrass
 Wild Garlic
 European black alder
 False indigo
 Wild chervil

 Common barberry
 Drooping brome-grass

 Canada thistle
 Marsh thistle
 Jimsom-weed
 Russian olive
 Elsholtzia
 Hairy willow-herb
 Leafy spurge
 Cottonweed
 Nepalese crane's-bill
 Gill-over-the-ground
 Japanese hops
 Hydrilla
 European frog's bit

<i>Impatiens glandulifera</i> Royle	Summer cypress
<i>Kochia scoparia</i> (L.) Schrader	Border privet
<i>Ligustrum obtusifolium</i> Sieb. & Zucc.	California privet
<i>Ligustrum ovalifolium</i> Hassk.	Chinese privet
<i>Ligustrum sinense</i> Lour.	European privet
<i>Ligustrum vulgare</i> L.	Amur honeysuckle
<i>Lonicera maackii</i> (Rupr.) Maxim.	Tatarian honeysuckle
<i>Lonicera tatarica</i> L.	European fly-honeysuckle
<i>Lonicera xylosteum</i> L.	Ragged robin
<i>Lychnis flos-cuculi</i> L.	Water shamrock
<i>Marsilea quadrifolia</i> L.	Eulalia
<i>Miscanthus sinensis</i> Anderss.	Forget-me-not
<i>Myosotis scorpioides</i> L.	Parrotfeather
<i>Myriophyllum aquaticum</i> (Vell.) Verdc.	Eutrophic water-nymph
<i>Najas minor</i> Allioni	Yellow floating heart
<i>Nymphoides peltata</i> (Gmel.) Kuntze	Scotch thistle
<i>Onopordum acanthium</i> L.	Star of Bethlehem
<i>Ornithogalum umbellatum</i> L.	Empress-tree
<i>Paulownia tomentosa</i> (Thunb.) Steudel	Reed canary-grass
<i>Phalaris arundinacea</i> L.	Canada blue-grass
<i>Poa compressa</i> L.	
<i>Polygonum cespitosum</i> Blume	White poplar
<i>Populus alba</i> L.	Kudzu
<i>Pueraria lobata</i> (Willd.) Owhi	Japanese rose
<i>Rosa rugosa</i> Thunb.	Lesser celandine
<i>Ranunculus ficaria</i> L.	Creeping buttercup
<i>Ranunculus repens</i> L.	Sheep sorrel
<i>Rumex acetosella</i> L.	Tansy ragwort, Stinking Willie
<i>Senecio jacobea</i> L.	Cup plant
<i>Silphium perfoliatum</i> L.	Climbing nightshade
<i>Solanum dulcamara</i> L.	Garden-heliotrope
<i>Valeriana officinalis</i> L.	Brooklime
<i>Veronica beccabunga</i> L.	

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APPENDIX C - SUSTAINABLE MATERIALS & ORGANIC PRODUCTS

The following list of sustainable materials and organic products is intended to give ideas for more environmentally friendly construction. The products and supplier listed herein simply represent examples of available materials and sources and are not endorsed by MDC.

Sustainable Materials

1. PAVING /SURFACE MATERIALS

Stabilized Aggregate

Description: A semi-porous, firm surface composed of crushed stone and an organic binder.

Uses: Trails, paths, parking, gateways, and interpretive waysides

Example: Minuteman National Park

Organic Binder Supplier: Stabilizer Solutions (www.StabilizerSolutions.com)

Porous Asphalt

Description: Modified bituminous concrete carefully sorted to remove all fines; its permeability is also contingent on a permeable subbase of crushed stone and filter fabric; requires periodic maintenance; long-term failure attributed to compaction of voids.

Uses: Parking stalls, paths

Example: Walden Pond Parking Lot

Recycled Bituminous Concrete

Description: Nonporous, flexible paving made from existing bituminous concrete; a paving machine can grind and repave.

Use: New bituminous concrete paths

Unit Pavers on Permeable Subgrade

Description: Concrete, brick, or asphaltic pavers set on a permeable subgrade of sand or crushed stone aggregate; paver joints must be open and edging is usually required; permeability aids in supplying water to rootzones of plants.

Uses: Gateways, parking stalls

Grassed Paving

Description: turfgrass or groundcovers growing up through open cells of concrete or plastic; porous; transfers weight of vehicles to an underlying base course.

Use: Overflow parking (for example at Dilboy Field)

Example: Minuteman Park overflow parking area

Glassphalt

Description: Crushed glass or “cullet” that has been made smooth through tumbling and used in place of sand in concrete or bituminous concrete, and to decorate outdoor tiles; must be used with other aggregates but can be quite colorful; not porous.

Uses: Paths, parking, interpretive paving, and concrete seat walls

Example: Danehy Park, Cambridge

Recycled Rubber

Description: Ground and remanufactured “crumb” rubber is inert and used as an accessible surface for paths.

Uses: Playground surfacing, asphalt paths, overlook areas

2. BUILDING MATERIALS

Plastic Lumber

Description: A simulated wood product made from recycled plastic, including milk jugs; biologically inert, durable, long-lasting, and requires little maintenance; disadvantages include higher cost and structural limitations.

Uses: Boardwalk decking and bumpers, viewing platforms, benches, trash receptacles, signage, and picnic tables

Recycled Composite Wood

Description: A simulated wood product made from fiber-reinforced polymers (FRP); biologically inert, durable, long-lasting, and requires little maintenance.

Uses: Pedestrian and vehicular bridges, boardwalk decking and bumpers, viewing platforms, benches, trash receptacles, signage, and picnic tables

Supplier/testing: The Advanced Engineered Wood Composites Center, University of Maine, Orono

Pressure-Treated Lumber

Description: An arsenic- and chromium-free preservative used to protect against rot, decay, and termite damage; can be used in sensitive areas, i.e., wetlands; can be painted and stained

Uses: Bridges and boardwalks (piers and decking), playground equipment, picnic tables, benches, and signage.

Supplier: CSI (www.treatedwood.com); other suppliers available.

3. LIGHTING

Low Voltage Lighting

Description: 12- and 24-volt systems place lighting only where needed (reducing waste), are very safe, and bulbs are recyclable.

Uses: Small parking areas and possibly gateways

Fiber Optic Lighting

Description: A single lamp transmitting light through optical fibers either at its end or side; very safe and can utilize colors.

Uses: Gateways, welcome center at Alewife Reservation, Mystic Gateway Park, or combined with interpretive features.

Solar Lighting

Description: 12- or 24-volt systems generated from photovoltaic (PV) cells; works best in areas removed from the power grid.

Uses: Emergency call boxes along Wayside Trail and Alewife Brook Parkway, seasonal lighting at fish viewing platforms

4. MANUFACTURED SOIL COMPONENTS

Biosolids Compost

Description: Nutrient-rich compost composed of biosolids (by-products of the wastewater treatment process) and sawdust or other carbonaceous materials; improves soil structure, provides essential plant nutrients, and plays an important role in preventing groundwater pollution; weed seeds and pathogens are killed through exposure to higher temperatures for an extended period of time.

Uses: Biofiltration areas, planting medium

Suppliers: Agresource (www.agresource.com); Coverttechnologies (coverttech@msn.com); other suppliers available

Brewing Byproducts

Description: Both spent hops (dried flowers and leaves) and malt (sprouted barley and often other grains) are potent nutrient sources with low C/N ratios; cheap and locally available.

Use: Planting medium

Organic Products

1. ALL-AROUND ORGANIC PRODUCT SUPPLY COMPANY IN NEW ENGLAND:

- North Country Organics, P.O. Box 372, Depot St., Bradford, Vermont 05033, ph: 802.222.4277, fax: 802.222.9661, web: www.norganics.com

This company provides a wide range of products including dry fertilizers and soil amendments in small bags (usually 50 lbs.), bulk bags, or bulk; organic compost (without biosolids) by the bulk trailer load; liquid fertilizers; inoculants; “natural” pest controls; and turf seed mixes. They also custom-

blend fertilizers in large quantities, 1 ton minimum.

North Country Organics Retail Suppliers in Eastern Massachusetts:

- Allendale Farm, 259 Allendale Rd., Brookline, MA 02146, phone: 617.524.1531 (also carries other organic supplies and plants)
- City Farm Florist and Nursery, 717 American Legion Hwy, Roslindale, MA 02131, ph: 800.676.3276 (also carries plants)
- Kipp's Greenhouse, Treat Rd., Marblehead, MA 01945, ph: 781.631.5035 (also carries tools, other organic supplies and plants)
- Marblehead Garden Center, 164 W. Shore Dr., Marblehead, MA 01945, ph: 800.356.8558 (also carries plants)
- Osborne Florist and Greenhouse, 10 Ocean Ave., Marblehead, MA 01945, ph: 781.631.2467 (also carries plants)
- Russell's Garden Center, 397 Boston Post Rd., Wayland, MA 01778, ph: 508.358.2283, www.russellsgardencenter.com (also carries tools, other organic supplies and plants)

North Country Organics Retail Distributors in Massachusetts:

- Bramen & Co./Snow Pond Farm Supply, 53 Mason St., Suite 102, Salem, 01970, ph: 978.745.7765, www.snow-pond.com (also carries tools and other organic supplies, but NO plants)

2. BOSTON AREA ORGANIC RETAIL SUPPLIERS OF PLANTS AND SOIL AMENDMENTS

- Mahoney's Garden Center, 880 Memorial Dr., Cambridge, MA 02138, ph: 617.354.4145
- Marino's Lookout Farm, 89 Pleasant Street, South Natick, MA 01760, ph: 508.651.1539, www.lookoutfarm.com
- Needham Garden Center, 53-R Chestnut St., Needham, MA 02492, ph: 781.444.2401
- Northeast Nurseries, 234 Newbury Street/Route 1 South, Peabody, MA 01960, ph: 978.535.6550, www.northeastnursery.com (also carries tools, other organic supplies, mulch, etc.)
- Windy-Lo Nursery, 309 Eliot St./Route 16, Natick, MA 01760, ph: 781.237.3014

Please note: Product lines at retail outfits may change from season to season, so always call first to confirm product availability.

3. NORTHEAST BIOSOLID COMPOST SUPPLIERS

- Agresource, 100 Main Street, Amesbury, MA 01913, ph: 800.313.3320, fax: 978.388.4198, email: info@agresourceinc.com, web: www.agresourceinc.com

APPENDIX D - MAINTENANCE

ROUTINE MAINTENANCE

Routine maintenance involves a recurring program of activities (weekly, monthly, seasonally, annually) to tend the landscape and perform minor repairs. In the Alewife Reservation, restored areas are expected to develop into largely self-sustaining natural systems, although there are infrastructure elements (e.g., stabilized aggregate paths and wooden overlooks) that will require periodic care. The Alewife Brook Greenway will receive more intensive human activity and consequently will require a higher level of care.

CLEAN-UPS AND TRASH REMOVAL

Keeping the Alewife Reservation, Alewife Brook, and Parkway free of debris will require frequent clean-up. Litter and trash should be removed weekly from all paths, walkways, roadways, parking lots, lawns and other planted areas. Trash receptacles should be limited (encourage carry-in, carry-out).

A major clean-up of all debris should be done in early spring and late fall. Storm drainage structures should be inspected and cleared of obstructions. Manholes, catch basins, and drain inlets should be opened and cleaned. Plant waste (e.g., fallen branches and leaves) should be collected from paved surfaces, boardwalks, overlooks, and lawn areas and composted on site. Composting should be established in a location with limited public access, yet close enough for easy access by maintenance staff. Invasive plant species, weeds with ripe seed heads, diseased plants, or unshredded woody debris larger than 1/4" diameter should not be composted. Composted material can be used to amend the soil in mown grass areas and in tree and shrub beds, saving the cost of both waste disposal and soil amendments.

SNOW REMOVAL

Snow removal is not recommended in the Alewife Reservation. Conversely, the roadways and paved walkways of the Alewife Brook Parkway will need to be cleared. In this ecologically sensitive area, snow removal should be conducted in a manner that causes minimal harm. Mechanical methods (plowing, shoveling) should be favored over snow and ice melting chemicals. The increased costs

for physical labor should be offset by reduced costs for chemicals and replacement/repair of damaged landscape and infrastructure elements.

When de-icing compounds are necessary, the least harmful chemicals should be used. Chemicals should be evaluated for their potential to damage vegetation (evidenced by foliage burn on grass at the edge of pavements, stunted perennial growth, and deformed buds on trees and shrubs), metals (corrosion and accelerated rusting of railings, furniture, grates, and drains), and hardscape (scaling or flaking of surface layers of concrete). Environmentally friendly ice control agents are available that have been shown to have fewer adverse effects on roadways, infrastructure, vehicles, and plants. For example, calcium magnesium acetate (CMA) can be used as an alternative to salt in environmentally sensitive areas. The compound has been found to have few serious negative effects, however, it is effective only to 21 degrees Fahrenheit (–6 degrees Celsius) and has a higher cost than conventional chemicals. Anti-icing agents, which prevent the formation of ice, are also available. Ice Ban, made from agricultural residues, is one commercially available compound with minimal negative impacts.

Abrasives such as sand and gravel are frequently used, alone or in conjunction with salt, to provide traction on slippery surfaces. However, large amounts will clog drains and waterways. An interesting alternative that has been used successfully in various locations (e.g., the University of Manitoba, Canada) is poultry grit. Used primarily as a feed supplement to aid digestion in chickens and turkeys, poultry grit has been found to be effective in increasing traction on snow or ice-covered pavements. In addition to its low cost, the grit is nontoxic and can be swept up in the spring and reused. However, its effect on drains and waterways with respect to clogging requires further investigation.

INVASIVE PLANT CONTROL

Invasive plant species should be monitored in both the Alewife Reservation and the Alewife Brook Greenway on a monthly basis and acceptable threshold levels should be determined. If the invading plants are limited in scope, then physical removal including the rootstock may be the most appropriate measure. As invasive populations of specific species rise, then other control measures might be necessary. Herbicide applications, mowing, harvesting, controlled burns, or a combination of these approaches might be considered. Long-term monitoring is critical to a successful control program because once an invasive species enters the landscape (or even remains in the “neighborhood”), it is very difficult to eradicate completely. The full range of invasive species should be monitored and managed, including aquatic, herbaceous, and woody types. See Appendix C for the Massachusetts list of invasive plant species.

TURF AND PLANT MAINTENANCE

Weed Control

Monthly weed control should be performed throughout the Alewife Brook Greenway during the growing season (April through October). Nonchemical methods (hand pulling, hoeing) are preferable, although limited application of herbicides may be needed under some circumstances. Any herbicide used should be applied according to the manufacturer's label and all state and federal laws governing the application of horticultural chemicals. The least toxic herbicides should be used whenever possible.

Pest And Disease Control

An Integrated Pest Management (IPM) approach should be adopted for pest and disease control activities. The goal of IPM is to reduce pests to acceptable levels using a combination of biological, physical, mechanical, cultural, and chemical controls. The practice of IPM rests on regular inspections to collect information for treatment decisions. Treatments are used only when the numbers of pests reach a specified level rather than being applied on a schedule. Also, IPM uses the smallest amounts of the least toxic compounds to achieve desired results.

In the Parkway section, all turfs, trees and shrubs should be monitored on a regular basis for the appearance of pests and disease. For identification of specific pests and diseases and recommendations for treatment, consult a county Extension Agent.

Watering

Once established, native plants do not require additional watering beyond normal seasonal rainfall. However, any new plantings will require additional water in the first three seasons until they become established; this is especially critical during the first season. In the Parkway section, additional watering during drought periods will benefit both newly planted trees and shrubs as well as established larger trees. Taking such a preventive approach will help maintain vigorous plant health and reduce the need for costly replacements.

Fertilizing Plantings

New plantings and existing tree and shrub beds that warrant special attention should be fertilized once in the spring with a granular slow-release fertilizer complying with state and federal laws. Fertilizer should not be over-applied. Organic fertilizer is preferred (100% by weight of the nitrogen content should be derived from organic materials). See Appendix D for a list of organic fertilizer resources.

Mulching

Trees and planting beds in the Parkway section should receive a protective

layer of mulch over root areas, similar to that provided by leaf litter in a natural forest. Mulch has many benefits: it reduces competition by grass roots with tree and plant roots, controls weeds, prevents and reduces soil compaction, preserves soil moisture, and discourages potentially injurious practices like mowing and string trimming near tree trunks or woody stems.

Mulch should be predominantly high quality aged hemlock bark, with the balance being spruce and pine bark. The depth of mulch in any tree or shrub bed should not exceed 3 inches.

In biofiltration areas, mulch is a key component that should be replaced annually.

Pruning

Trees and shrubs along the Parkway should be pruned annually to remove dead, dying, and diseased branches. Most pruning should be done during the dormant season, however, branches that constitute health or safety hazards should be pruned as soon as possible. Pruning above 15 feet should be done by a professionally trained, state-certified arborist.

Mowing

Areas in the Reservation and the Parkway are designated as either low- or high- maintenance mow zones. Existing or proposed meadows are low-maintenance mow zones that should be mowed once or twice a year to a height of 6 to 12 inches. Mowing in early spring before most perennial wildflowers appear allows for greater control of weeds and unwanted cold-season grasses. However, spring mowing should be planned with regard to the likely arrival of ground-nesting birds. Mowing in early fall allows for maximum seed head production and distribution and cuts back woody growth, but does not control cold-season grasses.

Meadows take an average of three years to become established. During that period, weeds and invasive species must be rigorously controlled. The MDC should expect to mow three or four times during the first season of growth. (Annual controlled burns are also a beneficial maintenance practice.)

Some turf grass areas along the Parkway will be replaced with a low-mow turf mix. This mix will produce a slow-growing ground cover that can be mowed as needed to a height of 6-9 inches, allowing for an intermediate landscape between meadow and lawn. Maintenance requirements are considerably less than those of conventional turf, but higher than for meadows.

In the Parkway area, playing fields and turf strips along the roadway and walkways will require frequent mowing. These high-maintenance mow

zones should be mowed throughout the growing season to a minimum height of 4 inches. Turf areas should not be mowed when the grass is wet or during a drought.

Seeding

Meadow areas may require overseeding during the first three years to combat weeds and invasives. Turf areas that are not covered with a satisfactory growth of grass and/or wildflowers should be seeded in late summer. See Appendix B for recommended seed lists. Seeded areas should be watered only during the first 6 to 8 weeks after seeding and the soil should be kept moist to a depth of 2 inches.

Replanting

Replanting of trees and shrubs in the Reservation and along the Parkway, when necessary, should occur in the spring prior to bud break after the ground has become firm enough to support vehicles without rutting. Some trees and shrubs may be planted in the fall. However, refer to Appendix B for plants that have a fall planting hazard rating and for recommended plant lists. Stumps of dead trees should be removed.

PATHS AND WALKWAYS

Throughout the site, paths and walkways should be inspected each spring and repaired as needed. Debris and weeds should be removed and cracks should be filled using appropriate materials and methods. The full width of paths should be maintained; pavement edges should be uniform and not allowed to break down. Wood structures such as boardwalks, overlooks, and bridges should be inspected and repaired as needed based on safety concerns. Wood should be treated with Seasonite every 3-5 years to prolong its life. Overhanging or obstructing vegetation should be cut back to maintain views and visibility.

SITE AMENITIES

Furniture, playground equipment, signage, and other site amenities should be inspected and repaired annually, or more frequently if staffing and budget permit. However, repairs that involve public health and safety, for example, broken light fixtures, should be carried out on an as needed basis.

Replacement

Over time, infrastructure and site amenities wear out and must be replaced. The MDC should identify those elements that will require periodic replacement, along with a schedule and budget to ensure that necessary improvements are made over the long term. Elements subjected to natural wear and high use, such as paved walks, wooden boardwalks, and overlooks, will eventually require reconstruction or full replacement. Re-

placement of plantings should also be anticipated as trees and shrubs age and decline significantly. Periodic catastrophic natural events will likely also require complete replacement or major repair of severely damaged site elements.



LEGEND:	
---	LIMIT OF PROJECT AREA
---	MDC OWNED PROPERTY
CULTURAL / RECREATIONAL FEATURES	
---	ASPHALT PATH (10-12 FT WIDTH)
---	STABILIZED AGGREGATE PATH (8-10 FT WIDTH)
◆◆◆	STABILIZED AGGREGATE TRAIL (4-6 FT WIDTH)
●●●	BOARDWALK
	PEDESTRIAN BRIDGE
---	EXISTING PATH (8-12 FT WIDTH)
---	EXISTING PATH (4-6 FT WIDTH)
---	FUTURE PATH (BY OTHERS)
⬢	PLATFORM OR OVERLOOK
⦿	VIEWING AREA (NEW & EXISTING)
⦿	NON-MOTOR BOAT ACCESS
✱	GATHERING PLACE
★	PUBLIC ART
⦿	INTERPRETIVE FEATURE
⦿	EDUCATIONAL STATION / NODE
⬢	RECREATIONAL AREAS
HABITAT & HYDROLOGY IMPROVEMENTS	
⦿	RAINGARDENS FOR STORMWATER TREATMENT
	PROPOSED & EXISTING MEADOW - LOW MAINTENANCE MOW ZONE
⬢	UPLAND FOREST DEVELOPMENT (SECONDARY)
⬢	WETLAND RESTORATION / CREATION
⬢	PERMANENT POOL/OPEN WATER
⬢	ISLAND CREATION
⬢	MONITOR/CONTROL INVASIVE PLANTS INCL. REMOVAL, AS NECESSARY. REPLANT WITH NATIVE SPECIES.



LEGEND:	
---	LIMIT OF PROJECT AREA
---	MDC OWNED PROPERTY
CULTURAL / RECREATIONAL FEATURES	
---	ASPHALT PATH (10-12 FT WIDTH)
---	STABILIZED AGGREGATE PATH (8-10 FT WIDTH)
◆◆◆	STABILIZED AGGREGATE TRAIL (4-6 FT WIDTH)
●●●	BOARDWALK
	PEDESTRIAN BRIDGE
---	EXISTING PATH (8-12 FT WIDTH)
---	EXISTING PATH (4-6 FT WIDTH)
---	FUTURE PATH (BY OTHERS)
⬢	PLATFORM OR OVERLOOK
👁	VIEWING AREA (NEW & EXISTING)
🚤	NON-MOTOR BOAT ACCESS
✳	GATHERING PLACE
★	PUBLIC ART
📌	INTERPRETIVE FEATURE
○	EDUCATIONAL STATION / NODE
▨	RECREATIONAL AREAS
HABITAT & HYDROLOGY IMPROVEMENTS	
💧	RAINGARDENS FOR STORMWATER TREATMENT
	PROPOSED & EXISTING MEADOW - LOW MAINTENANCE MOW ZONE
▨	UPLAND FOREST DEVELOPMENT (SECONDARY)
▨	WETLAND RESTORATION / CREATION
▨	PERMANENT POOL/OPEN WATER
⬢	ISLAND CREATION
▨	MONITOR/CONTROL INVASIVE PLANTS INCL. REMOVAL, AS NECESSARY. REPLANT WITH NATIVE SPECIES.

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APPENDIX E - MASTER PLAN



LEGEND	
	RESERVATION & PARKWAY BOUNDARY
	MDC - OWNED PROPERTY
CULTURAL / RECREATIONAL FEATURES	
	ASPHALT PATH (10-12 FT WIDTH)
	STABILIZED AGGREGATE PATH (8-10 FT WIDTH)
	STABILIZED AGGREGATE TRAIL (6-8 FT WIDTH)
	BOARDWALK (IN SENSITIVE WILDLIFE AREAS)
	PEDESTRIAN BRIDGE
	PEDESTRIAN UNDERPASS
	EXISTING PATH (8-12 FT WIDTH)
	EXISTING PATH (6-8 FT WIDTH)
	FUTURE PATH (BY OTHERS)
	CONNECTION TO EXISTING OR PROPOSED TRAIL
	PLATFORM OR OVERLOOK
	VIEWING AREA (NEW & EXISTING)
	NON-MOTOR BOAT ACCESS
	PARKING (NEW & EXISTING)
	CROSSING (PROPOSED & EXISTING) TRAFFIC LIGHT CONTROLLED
	GATEWAY / PRIMARY ENTRANCE
	NEIGHBORHOOD ACCESS
	GATHERING PLACE
	PUBLIC ART
	INTERPRETIVE FEATURE
	EDUCATIONAL STATION / NODE
HABITAT & HYDROLOGY IMPROVEMENTS	
	FLOOD STORAGE / CONTROL
	RAINGARDENS FOR STORMWATER TREATMENT
	EXISTING MEADOW TO MAINTAIN
	PROPOSED MEADOW
	NATURAL CHANNEL RESTORATION
	IN-CONCRETE CHANNEL HABITAT ENHANCEMENT
	RIPARIAN HABITAT EXPANSION
	UPLAND FOREST DEVELOPMENT (SECONDARY)
	WETLAND RESTORATION / CREATION
	FUTURE CONSERVATION RESTRICTION AREAS (BY OTHERS)
	IDENTIFY & CERTIFY VERNAL POOLS
	PARKWAY RESTORATION (RECLAIM LAND, TREE PLANTING, HISTORIC LIGHTING)
	ISLAND CREATION
	BANK STABILIZATION
	PERMANENT POOLOPEN WATER
	SEDIMENT DREDGING
PROPOSALS OUTSIDE MDC PROPERTY	
	IMPROVE FISH PASSAGE
	STREAM DAYLIGHTING
	NEW CHANNEL CONNECTION
	IMPROVE HYDROLOGICAL CONNECTION
	PROPOSED LAND ACQUISITION



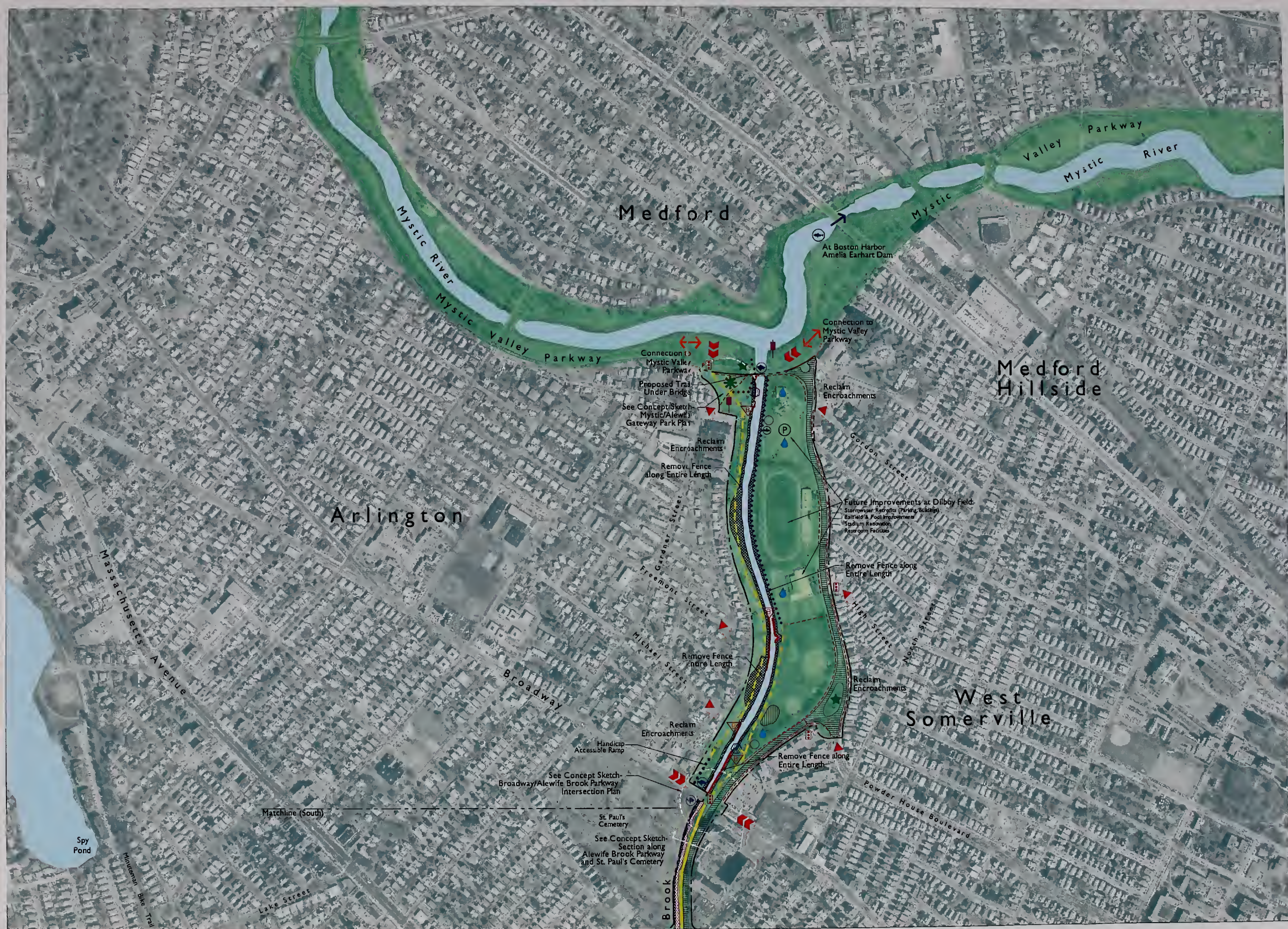
Alewife Reservation & Alewife Brook

Arlington, Belmont, Cambridge, and Somerville, MA



Master Plan - South

June 2003



LEGEND:	
RESERVATION & PARKWAY BOUNDARY	MDC OWNED PROPERTY
CULTURAL / RECREATIONAL FEATURES	
ASPHALT PATH (10-12 FT WIDTH)	STABILIZED AGGREGATE PATH (8-10 FT WIDTH)
STABILIZED AGGREGATE TRAIL (4-6 FT WIDTH)	BOARDWALK (IN SENSITIVE WILDLIFE AREAS)
PEDESTRIAN BRIDGE	PEDESTRIAN UNDERPASS
EXISTING PATH (8-12 FT WIDTH)	EXISTING PATH (4-6 FT WIDTH)
FUTURE PATH (BY OTHERS)	CONNECTION TO EXISTING OR PROPOSED TRAIL
PLATFORM OR OVERLOOK	VIEWING AREA (NEW & EXISTING)
NON-MOTOR BOAT ACCESS	PARKING (NEW & EXISTING)
CROSSING (PROPOSED & EXISTING) TRAFFIC LIGHT CONTROLLED	GATEWAY / PRIMARY ENTRANCE
NEIGHBORHOOD ACCESS	GATHERING PLACE
PUBLIC ART	INTERPRETIVE FEATURE
EDUCATIONAL STATION / NODE	
HABITAT & HYDROLOGY IMPROVEMENTS	
FLOOD STORAGE / CONTROL	RAINGARDENS FOR STORMWATER TREATMENT
EXISTING MEADOW TO MAINTAIN	PROPOSED MEADOW
NATURAL CHANNEL RESTORATION	IN-CONCRETE CHANNEL HABITAT ENHANCEMENT
RIPARIAN HABITAT EXPANSION	UPLAND FOREST DEVELOPMENT (SECONDARY)
WETLAND RESTORATION / CREATION	FUTURE CONSERVATION RESTRICTION AREAS (BY OTHERS)
IDENTIFY & CERTIFY VERNAL POOLS	PARKWAY RESTORATION (RECLAIM LAND, TREE PLANTING, HISTORIC LIGHTING)
ISLAND CREATION	BANK STABILIZATION
PERMANENT POOL/OPEN WATER	SEDIMENT DREDGING
PROPOSALS OUTSIDE MDC PROPERTY	
IMPROVE FISH PASSAGE	STREAM DAYLIGHTING
NEW CHANNEL CONNECTION	IMPROVE HYDROLOGICAL CONNECTION
PROPOSED LAND ACQUISITION	

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